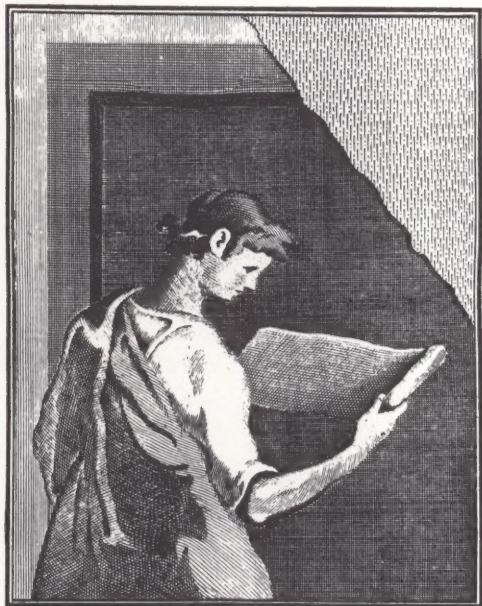


THE YEAR BOOK FOR COLORISTS & DYERS

COMPLIMENTS
OF
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NEW YORK, BOSTON,
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CHICAGO.

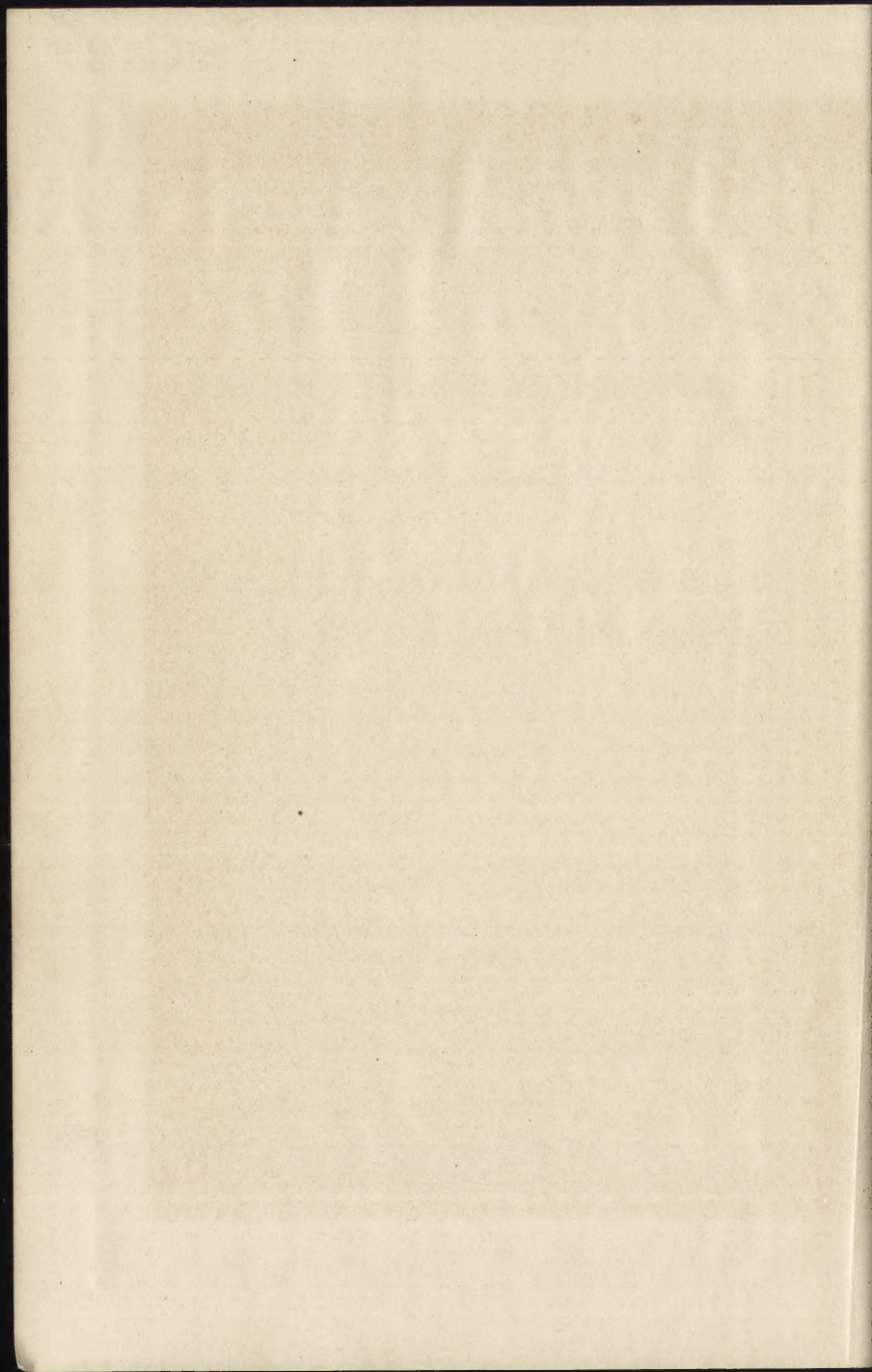
VOLUME IV.
1902



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Serial



THE YEAR-BOOK
FOR
COLORISTS AND DYERS

Presenting a Review of the Year's
Advances in the Bleaching, Dyeing,
Printing, and Finishing of Textiles.

BY
HERMAN A. METZ

VOLUME IV

NEW YORK 1901

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By Herman A. Metz*

NEW YORK
WM. J. BROWN, PUBLISHER
1902.

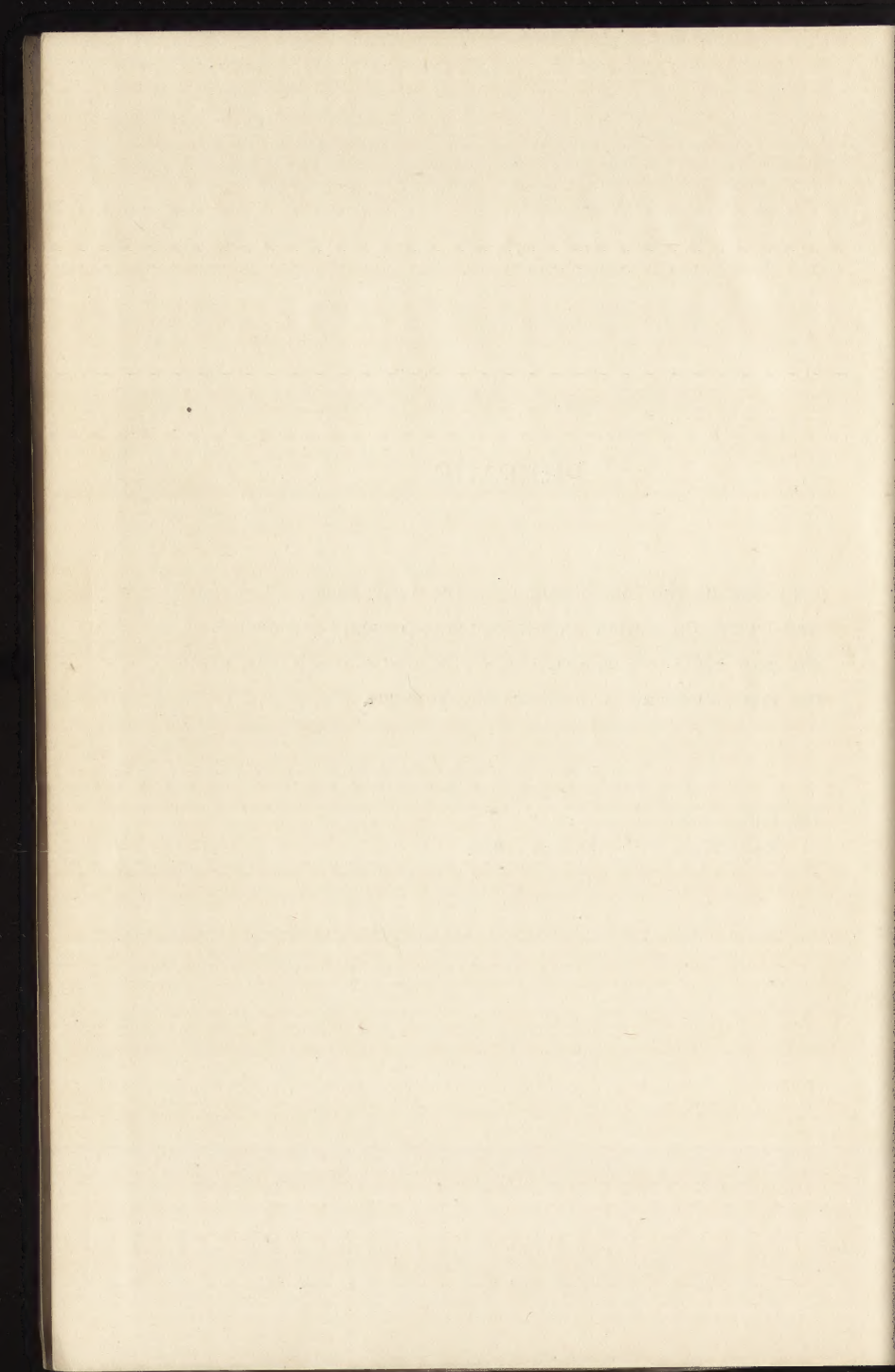
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PREFACE.

In offering the fourth volume of the Year Book for Colorists and Dyers, the author has attempted to present the novelties of the year 1901 in a compact form. He trusts it will meet with the same approval as the preceding volumes.

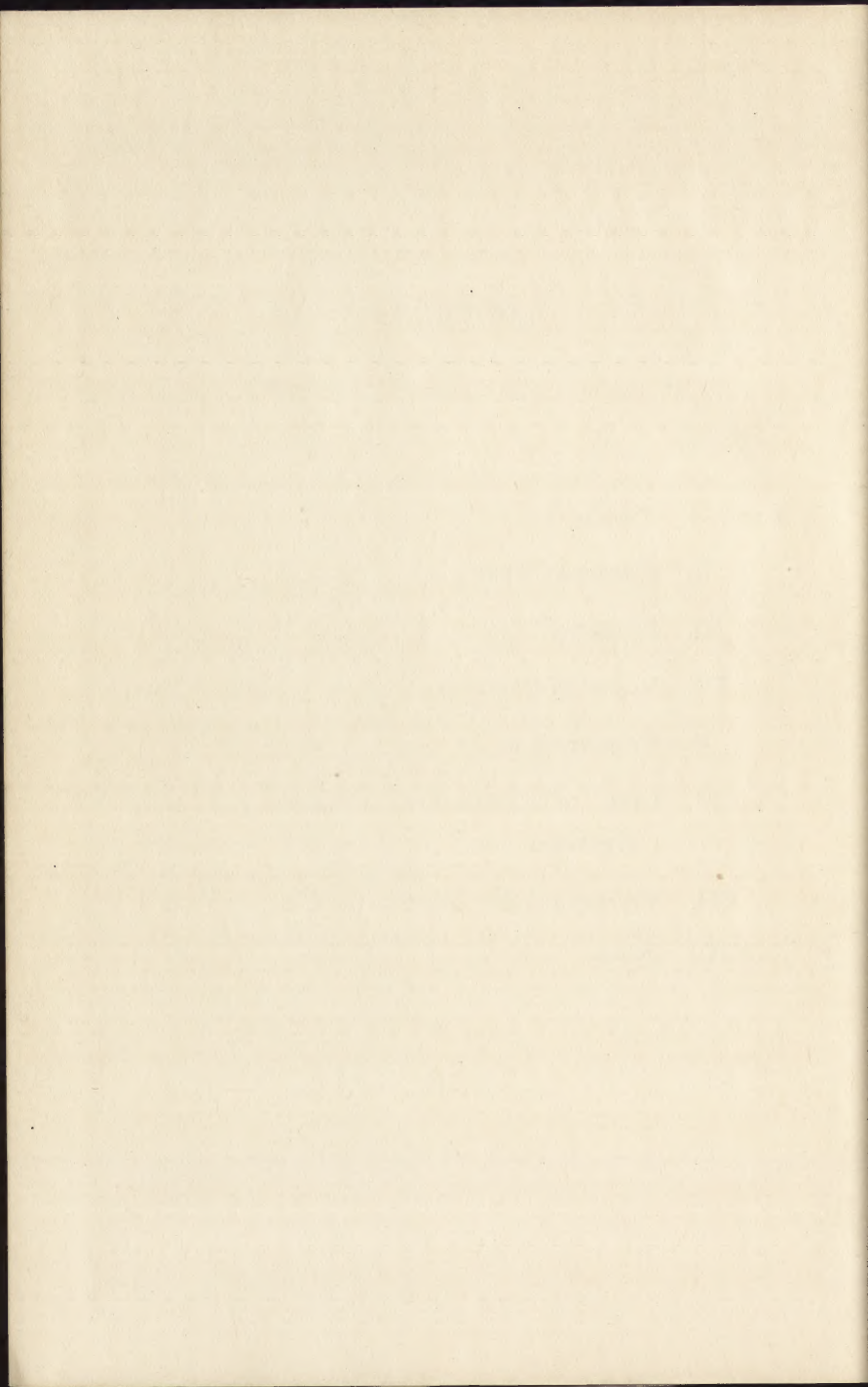
HERMAN A. METZ,

122 HUDSON STREET,
NEW YORK CITY, MARCH, 1902.



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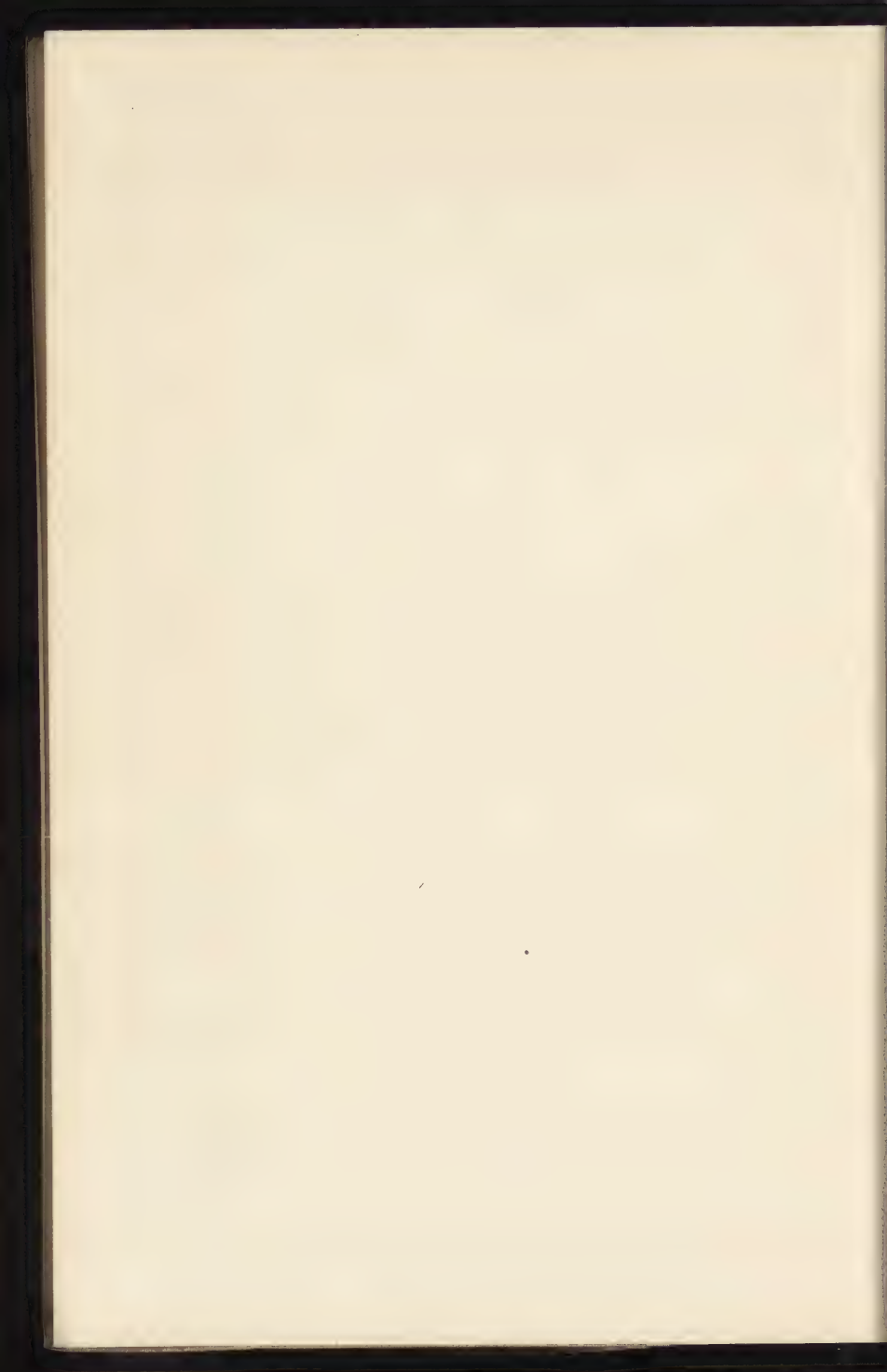
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PART I.



TABLES.



TABLES.

THE METRIC SYSTEM, WITH EQUIVALENTS.

The entire metric system of weights and measures is based upon a fundamental unit called a meter, which is the ten-millionth part of the distance from the equator to the pole, and is the principal unit of linear measure.

The are, or unit of square measure, is a square whose side is 10 meters.

The stère, or unit of cubic measure, is a cube whose edge is a meter.

The liter, or unit of all measures of capacity, is a cube whose edge is the tenth of a meter.

The gram, or unit of weight, is the weight of a cube of pure water at its greatest density, the edge of which is the hundredth part of a meter.

Elements of the System.

Length.	Surface.	Capacity.	Weight.	Notation.
Myriameter.			Metric ton.	1,000,000
Kilometer.			Quintal	100,000
Hectometer.			Myriagram.	10,000
Decameter.			Kilogram.	1,000
	Hectare.	Kiloliter.	Hectogram.	100
	Decare.	Decaliter	Decagram.	10
<i>Meter.</i>	<i>Are.</i>	<i>Liter.</i>	<i>Gram.</i>	1
Decimeter.		Deciliter.	Decigram.	.1
Centimeter.	Centiare.	Centiliter.	Centigram.	.01
Millimeter.		Milliliter	Milligram.	.001

Linear, or Long, Measure.

	Meters.	Inches.	Feet.	Yards.	Miles.
Millimeter.....	.001	.03937	.00328	.03109	-----
Centimeter.....	.01	.3937	.03280	.01093	-----
Decimeter.....	.1	3.937	.32808	.10936	.00066
Meter.....	1	39.37	3.28083	1.09361	.00062
Decameter.....	10	-----	32.80833	10.93611	.00621
Hectometer.....	100	-----	328.0833	109.3611	.06213
Kilometer.....	1,000	-----	3,280.833	1,093.611	.62137
Myriameter.....	10,000	-----	-----	-----	6.2137

¹39.37 inches is the legalized equivalent of the meter in the United States. The exact equivalent is 39.37079 inches.

Square Measure.

	Square Meters.	Square Inches.	Square Feet.	Square Yards.	Acres.
Milliare.....	.1	155	1.0764	.1196	-----
Centiare, or square meter.	1	1,550	10.764	1.196	-----
Deciare.....	10	-----	107.64	11.96	.0024
Are, or square decameter.	100	-----	1,076.4	119.6	.0247
Decare.....	1,000	-----	-----	1,196	.2471
Hectare.....	10,000	-----	-----	-----	2.471

A square centimeter equals 0.155 square inches, a square decimeter 15.5 square inches, and a square kilometer 0.386 square miles.

Cubic Measure.

	Cubic Meters.	Cubic Inches.	Cubic Feet.	Cubic Yards.
Millistere, or cubic decimeter.....	.001	61.023	.035314	-----
Centistere.....	.01	610.23	.35314	.01308
Decistere.....	.1	-----	3.5314	.1308
Stere, or cubic meter.....	1	-----	5.314	1.308
Decastere.....	10	-----	53.14	13.08
Hectostere.....	100	-----	-----	130.8

Measure of Capacity.

	Liters.	Fluid Ounces.	Quarts.	Gallons.	Bushels.
Milliliter, or cubic centimeter.....	.001	.0338	.00106	-----	-----
Centiliter.....	.01	.338	.01057	.00264	-----
Deciliter.....	.1	3.38	.10567	.02642	.002838
Liter, or cubic decimeter.....	1	33.8	1.0567	.26417	.028377
Decaliter.....	10	338	10.567	2.6417	.283774
Hectoliter.....	100	-----	105.67	26.417	2.83774
Kiloliter.....	1,000	-----	-----	264.17	28.3774
Myrialiter.....	10,000	-----	-----	2,641.7	283.774

A liter of water at its maximum density weighs a kilogram.

Weight.

	Grams.	Grains.	Ounces Avoirdupois.	Pounds Avoirdupois.	Tons of 2,240 Pounds.
Milligram .....	.001	.01543	-----	-----	-----
Centigram .....	.01	.15432	-----	-----	-----
Decigram .....	.1	1.54324	.0035	-----	-----
Gram	1	15.43236	.0353	.0022	-----
Decagram	10	154.32356	.3527	.0220	-----
Hectogram	100	1,543.23564	3.5274	.22046	-----
Kilogram	1,000	15,432.35639	35.274	2.20462	.000984
Myriagram	10,000	-----	-----	22.0462	.009842
Quintal	100,000	-----	-----	220.462	.09842
Millier, or tonne.	1,000,000	-----	-----	2,204.62	.9842

COMPARISON OF METRIC SYSTEM WITH THE
UNITED STATES METHOD OF WEIGHTS AND
MEASURES.

(Arranged in Alphabetical Order.)

Are (100 square meters)=119.6 square yards.

Bushel=2150.42 cubic inches, 35.24 liters.

Centare (1 square meter)=1,550 square inches.

Centigram 1/100 gram)=0.1543 grain.

Centiliter (1/100 liter)=2.71 fluid drams, 0.338 fluid ounce.

Centimeter (1/100 meter)=0.3937 inch.

1 Cubic centimeter =16.23 minims (Apothecaries).

10 " centimeters= 2.71 fluid drams (Apothecaries).

30 " " = 1.01 " ounces " "

100 " " = 3.38 " " " "

473 " " =16.00 " " " "

500 " " =16.90 " " " "

1,000 " " =33.81 " " " "

Decigram (1/10 gram)=1.5432 grains.

Decimeter (1/10 meter)=3.937 inches.

Deciliter (1/10 liter)=0.845 gill.

Deka gram (10 grams)=0.3527 ounce.

Dekaliter (10 liters)=9.08 quarts (dry), 2.6418 gallons.

Dekameter (10 meters)=393.7 inches.

Dram (Apothecaries or Troy)=3.9 grams.

Foot=0.3048 meter, or 30.48 centimeters.

Gallon=4,543 liters.

Gill=0.118295 liter, or 142 cubic centimeters.

Grain (Troy)=0.064804 gram.

Grain=0.0648 gram.

Gram=15.432 grains.

Hectare (10,000 square meters)=2.471 acres.

Hectogram=3.5274 ounces.

Hectoliter (100 liters)=2.838 bushels, or 26.418 gallons.

Hectometer (100 meters)=328 feet 1 inch.

Hundredweight (112 pounds Avoirdupois)=50.8 kilograms.

Inch=0.0254 meter.

Inch=2.54 centimeters.

Inch=25.40 millimeters.

Kilogram=2.2046 pounds, or 35.274 ounces.

Kiloliter (1,000 liters)=1.308 cubic yards, or 264.18 gallons.

Kilometer (1,000 meters)=0.62137 mile (3,280 feet 10 inches).

Liter=1.0567 quarts, 0.264 gallon (liquid), or 0.908 quart (dry).

Meter=39.3704 inches, or 3.28087 feet.

Mile=1.609 kilometers.

Mile=5,280 feet, or 1609.3 meters.

Millier or tonneau=2,204.6 pounds.

Milligram=0.0154 grain.

Millimeter (1/1,000 meter)=0.0394 inch.

Myriagram=22.046 pounds.

Myriameter (10,000 meters)=6.2137 miles.

Ounce (Avoirdupois)=28.350 grams.

Ounce (fluid)=28.3966 cubic centimeters.

Ounce (Troy or Apothecaries)=31.104 grams.

Ounce (Avoirdupois)=28.35 grams.

Peck=9.08 liters.

Pint (liquid)=0.47318 liter (liquid), or 0.568 (dry).

Pound (Avoirdupois)=453.603 grams.

Pound (English)=0.453 kilogram.

Pound (Troy)=373.25 grams.

Quart=1.1352 liters.

Quart (liquid)=0.94636 liter.

Quintal=220.46 pounds.

Scruple (Troy)=1.296008 grams.

Ton=20 hundredweight=2,240 pounds (Avoirdupois) 1016.070 kilograms.

Yard=0.9144 meter.

MISCELLANEOUS WEIGHTS.

Barrel of flour=196 pounds.

Barrel of salt=280 pounds.

Bale of cotton (in America)=400 pounds.

Bale of cotton (in Egypt)=90 pounds.

Bag of Sea Island cotton=300 pounds.

Cable=120 fathoms.

Can=35 pounds.

Cask of lime=240 pounds.

Fathom=6 feet.

Hand=4 inches.

Hogshead=63 gallons.

Keg (nails)=100 pounds.

Pace=3.3 feet.

Palm=3 inches.

Pipe=2 hogsheads.

Stone=14 pounds.

Tun=2 pipes.

Cubic foot of water weighs 62.4 pounds.

Cubic foot of water is 7.48 gallons

Gallon of water weighs 8 1-3 pounds.

Gallon of water is 231 cubic inches.

In England, wool is sold by the sack, or boll, of 22 stones, which, at 14 pounds to the stone, is 308 pounds.

A pack of wool is 17 stones and 2 pounds which is rated as a pack load for a horse. It is 240 pounds.

Sack of flour=280 pounds.

A tod of wool is 2 stones of 14 pounds.

A wey of wool is $6\frac{1}{4}$ tods. Two weys, a sack.

A clove of wool is half a stone.

TABLE OF MULTIPLES.

Centimeters	×	0.3937	=inches.
Centimeters	×	0.0328	=feet.
Centimeters, cubic,	×	0.0338	=apothecaries' fluid ounces.
Diameter of a circle	×	3.1416	=circumference.
Gallons	×	3.785	=liters.
Gallons	×	0.833565	=imperial gallons.
Gallons	×	8.33505	=pounds of water.
Gallons, imperial,	×	1,199666	=U. S. gallons.
Gallons, imperial,	×	10	=pounds of water.
Gallons, imperial,	×	4.54102	=liters.
Grains	×	0.0648	=grams.
Inches	×	0.0254	=meters.
Inches	×	25.4	=millimeters.
Miles	×	1.609	=kilometers.
Ounces, Troy,	×	1.097	=ounces of avoirdupois.
Ounces, avoirdupois,	×	0.9115	=ounces Troy.
Pounds, avoirdupois	×	0.4536	=kilograms.
Pounds, avoirdupois,	×	0.8228572	=pounds Troy.
Pounds, Troy,	×	0.37286	=kilograms.
Pounds, Troy,	×	1.21527	=pounds avoirdupois.
Radius of a circle	×	6.283185	=circumference.
Square of the radius	×	3.1416	=area.
Square of the circumference of a circle	×	0.07958	=area.

THERMOMETRY.

Fahr.	Centigr.	Fahr.	Centigr.	Fahr.	Centigr.
—10	—23.33	83	28.33	176	80.00
— 9	—22.78	84	28.89	177	80.56
— 8	—22.22	85	29.44	178	81.12
— 7	—21.67	86	30.00	179	81.67
— 6	—21.11	87	30.56	180	82.23
— 5	—20.56	88	31.11	181	82.78
— 4	—20.00	89	31.67	182	83.34
— 3	—19.44	90	32.22	183	83.89
— 2	—18.89	91	32.78	184	84.45
— 1	—18.33	92	33.33	185	85.00
0	—17.78	93	33.89	186	85.56
1	—17.22	94	34.44	187	86.12
2	—16.67	95	35.00	188	86.67
3	—16.11	96	35.56	189	87.23
4	—15.56	97	36.11	190	87.78
5	—15.00	98	36.67	191	88.34
6	—14.44	99	37.22	192	88.89
7	—13.89	100	37.78	193	89.45
8	—13.33	101	38.34	194	90.00
9	—12.78	102	38.89	195	90.56
10	—12.22	103	39.45	196	81.12
11	—11.67	104	40.00	197	91.67
12	—11.11	105	40.56	198	92.23
13	—10.56	106	41.12	199	92.78
14	—10.00	107	41.67	200	93.34
15	— 9.44	108	42.23	201	93.89
16	— 8.89	109	42.78	202	94.44
17	— 8.33	110	43.34	203	95.00
18	— 7.78	111	43.89	204	95.55
19	— 7.22	112	44.45	205	96.11
20	— 6.67	113	45.00	206	96.67
21	— 6.11	114	45.56	207	97.22
22	— 5.56	115	46.22	208	97.78
23	— 5.00	116	46.67	209	98.33
24	— 4.44	117	47.23	210	98.89
25	— 3.89	118	47.78	211	99.44
26	— 3.33	119	48.34	212	100.00
27	— 2.78	120	48.89	213	100.55
28	— 2.22	121	49.45	214	101.11
29	— 1.67	122	50.00	215	101.67
30	— 1.11	123	50.56	216	102.22
31	— 0.56	124	51.12	217	102.78
32	— 0.00	125	51.67	218	103.33
33	0.56	126	52.23	219	103.89
34	1.11	127	52.78	220	104.44
35	1.67	128	53.34	221	105.00

Fahr.	Centigr.	Fahr.	Centigr.	Fahr.	Centigr.
36	2.22	129	53.89	222	105.55
37	2.78	130	54.45	223	106.11
38	3.33	131	55.00	224	106.67
39	3.89	132	55.56	225	107.22
40	4.44	133	56.12	226	107.78
41	5.00	134	56.67	227	108.33
42	5.56	135	57.23	228	108.89
43	6.11	136	57.78	229	109.44
44	6.67	137	58.34	230	110.00
45	7.22	138	58.89	231	110.55
46	7.78	139	59.45	232	111.11
47	8.33	140	60.00	233	111.67
48	8.89	141	60.56	234	112.22
49	9.44	142	61.12	235	112.78
50	10.00	143	61.67	236	113.33
51	10.56	144	62.23	237	113.89
52	11.11	145	62.78	238	114.44
53	11.67	146	63.34	239	115.00
54	12.22	147	63.89	240	115.55
55	12.78	148	64.45	241	116.11
56	13.33	149	65.00	242	116.67
57	13.89	150	65.56	243	117.22
58	14.44	151	66.12	244	117.78
59	15.00	152	66.67	245	118.33
60	15.56	153	67.23	246	118.89
61	16.11	154	67.78	247	119.44
62	16.67	155	68.34	248	120.00
63	17.22	156	68.89	249	120.55
64	17.78	157	69.45	250	121.11
65	18.33	158	70.00	251	121.67
66	18.89	159	70.56	252	122.22
67	19.44	160	71.12	253	122.78
68	20.00	161	71.67	254	123.33
69	20.56	162	72.23	255	123.89
70	21.11	163	72.78	256	124.44
71	21.67	164	73.34	257	125.00
72	22.22	165	73.89	258	125.55
73	22.78	166	74.45	259	126.11
74	23.33	167	75.00	260	126.67
75	23.89	168	75.56	261	127.22
76	24.44	169	76.12	262	127.78
77	25.00	170	76.67	263	128.33
78	25.56	171	77.23	264	128.89
79	26.11	172	77.78	265	129.44
80	26.67	173	78.34	266	130.00
81	27.22	174	78.89		
82	27.78	175	79.45		

Another Method to Transform Fahrenheit to Centigrade,
or vice versa, is the formula:

$$C \times 9$$

$$\text{---} + 32 \text{ equals Fahrenheit. ---}$$

5

5

$$F - 32 \times \text{---} \text{ equals Centigrade.}$$

9

Comparison Between the Scales of Fahrenheit, Réamur and
the Centigrade.

(Zero Fahrenheit corresponds with minus 17.78 Centigrade
and minus 14.22 Réamur.)

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
100	212	80	24	75.2	19.2
99	210.2	79.2	23	73.4	18.4
98	208.4	78.4	22	71.6	17.6
97	206.6	77.6	21	69.8	16.8
96	204.8	76.8	20	68	16
95	203	76	19	66.2	15.2
94	201.2	75.2	18	64.4	14.4
93	199.4	74.4	17	62.6	13.6
92	197.6	73.6	16	60.8	12.8
91	195.8	72.8	15	59	12
90	194	72	14	57.2	11.2
89	192.2	71.2	13	55.4	10.4
88	190.4	70.4	12	53.6	9.6
87	188.6	69.6	11	51.8	8.8
86	186.8	68.8	10	50	8
85	185	68	9	48.2	7.2
84	183.2	67.2	8	46.4	6.4
83	181.4	66.4	7	44.6	5.6
82	179.6	65.6	6	42.8	4.8
81	177.8	64.8	5	41	4
80	176	64	4	39.2	3.2
79	174.2	63.2	3	37.4	2.4
78	172.4	62.4	2	35.6	1.6
77	170.6	61.6	1	33.8	0.8
76	168.8	60.8	Zero	32	Zero
75	167	60	1	30.2	0.8
74	165.2	59.2	2	28.4	1.6

10 YEAR BOOK FOR COLORISTS AND DYERS.

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
73	163.4	58.4	3	26.6	2.4
72	161.6	57.6	4	24.8	3.2
71	159.8	56.8	4	24.8	3.2
70	158	56	5	23	4
69	156.2	55.2	6	21.2	4.8
68	154.4	54.4	7	19.4	5.6
67	152.6	53.6	8	17.6	6.4
66	150.8	52.8	9	15.8	7.2
65	149	52	9	15.8	7.2
64	147.2	51.1	10	14	8
63	145.4	50.4	11	12.2	8.8
62	143.6	49.6	12	10.4	9.6
61	141.8	48.8	13	8.6	10.4
60	140	48	14	6.8	11.2
59	138.2	47.2	15	5	12
58	136.4	46.4	16	3.2	12.8
57	134.6	45.6	17	1.4	13.6
56	132.8	44.8	18	—	14.4
55	131	44	19	2.2	15.2
54	129.2	43.2	20	4	16
53	127.4	42.4	21	5.8	16.8
52	125.6	41.6	22	7.6	17.6
51	123.8	40.8	23	9.4	18.4
50	122	40	24	11.2	19.2
49	120.2	39.2	25	13	20
48	118.4	38.4	26	14.8	20.8
47	116.6	37.6	27	16.6	21.6
46	114.8	36.8	28	18.4	22.4
45	113	36	29	20.2	23.2
44	111.2	35.2	30	22	24
43	109.4	34.4	31	23.8	24.8
42	107.6	33.6	32	25.6	25.6
41	105.8	32.8	33	27.4	26.4
40	104	32	34	29.2	27.2
39	102.2	31.2	35	31	28
38	100.4	30.4	36	32.8	28.8
37	98.6	29.6	37	34.6	29.6
36	96.8	28.8	38	36.4	30.4
35	95	28	39	38.2	31.2
34	93.2	27.2	40	40	32
33	91.4	26.4	41	41.8	32.8
32	89.6	25.6	42	43.6	33.6
31	87.8	24.8	43	45.4	34.4
30	86	24	44	47.2	35.2
29	84.2	23.2	45	49	36
28	82.4	22.4	46	50.8	36.8
27	80.6	21.6	47	52.6	37.6
26	78.8	20.8	48	54.4	38.4
25	77	20	49	56.2	39.2

SULPHURIC ACID.

The Manufacturing Chemists' Association have adopted the following figures as representing the per cent. of H_2SO_4 in an oil of vitriol. Since colorists rarely or never need to look up an acid below 80 per cent. oil of vitriol, the table only goes to that degree.

Beaumé.	Sp. Gr.	H_2SO_4 .	Oil Vitriol.
66	1.835	93.50	100
65	1.814	88.82	95
64	1.793	86.30	92
63	1.775	84.50	89
62	1.767	83.21	87
61	1.727	79.47	85
60	1.705	77.60	83
59	1.683	75.73	81

FORMALDEHYDE—SPECIFIC GRAVITY OF SOLUTIONS.

Specific Gravity at 15.6°C.	Percentage by Weight.	Percentage by Volume.
1.0025	1.0	1.0
1.0125	5.0	5.0
1.0250	10.0	10.25
1.0380	15.0	15.6
1.0530	20.0	21.1
1.0670	25.0	26.7
1.0830	30.0	32.5
1.1040	35.0	38.6
1.1250	40.0	45.0

This table is by W. A. Davis, in the Journal of Society of Chemical Industry. 1897, 502.

SPECIFIC GRAVITY OF HYDROCHLORIC ACID
SOLUTIONS.

Specific gravity.	Degrees Beaumé.	Percentage HCl.
1.005	0.7	1.15
1.010	1.4	2.14
1.015	2.1	3.12
1.020	2.7	4.13
1.025	3.4	5.15
1.030	4.1	6.15
1.035	4.7	7.15
1.040	5.4	8.16
1.045	6.0	9.16
1.050	6.7	10.17
1.055	7.4	11.18
1.060	8.0	12.19
1.065	8.7	13.19
1.070	9.4	14.17
1.075	10.0	15.16
1.080	10.6	16.15
1.085	11.2	17.13
1.090	11.9	18.11
1.095	12.4	19.06
1.100	13.0	20.01
1.105	13.6	20.97
1.110	14.2	21.92
1.115	14.9	22.86
1.120	15.4	23.82
1.125	16.0	24.78
1.130	16.5	25.75
1.135	17.1	26.70
1.140	17.7	27.66
1.1425	18.0	28.14
1.145	18.3	28.61
1.150	18.8	29.57
1.152	19.0	29.95
1.155	19.3	30.55
1.160	19.8	31.52

TABLES.

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Specific gravity.	Degrees Beaumé.	Percentage HCl.
1.163	20.0	32.10
1.165	20.3	32.49
1.170	20.9	33.46
1.171	21.0	33.65
1.175	21.4	34.42
1.180	22.0	35.39
1.185	22.5	36.31
1.190	23.0	37.23
1.195	23.5	38.16
1.200	24.0	39.11

NITRIC ACID—SPECIFIC GRAVITY AND STRENGTH OF
SOLUTIONS AT 0° C.

Specific Gravity.	Degrees Bé.	Per cent. HNO ₃ .	Per cent. N ₂ O ₅ .
1.007	1	1.1	0.9
1.014	2	2.2	1.9
1.022	3	3.4	2.9
1.029	4	4.5	3.9
1.036	5	5.5	4.7
1.044	6	6.7	5.7
1.052	7	8.0	6.9
1.060	8	9.2	7.9
1.067	9	10.2	8.7
1.075	10	11.4	9.8
1.083	11	12.6	10.8
1.091	12	13.8	11.8
1.100	13	15.2	13.0
1.108	14	16.4	14.0
1.116	15	17.6	15.1
1.125	16	18.9	16.2
1.134	17	20.2	17.3
1.143	18	21.6	18.5
1.152	19	22.9	19.6
1.161	20	24.2	20.7
1.171	21	25.7	22.0
1.180	22	27.0	23.1
1.190	23	28.5	24.4
1.199	24	29.8	25.5
1.210	25	31.4	26.9
1.221	26	33.1	28.4
1.231	27	34.6	29.7

TABLES.

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Specific Gravity.	Degrees Bé.	Per cent. HNO ₃ .	Per cent. N ₂ O ₅ .
1.242	28	36.2	31.0
1.252	29	37.7	32.3
1.261	30	39.1	33.5
1.275	31	41.1	35.2
1.286	32	42.6	36.5
1.298	33	44.4	38.0
1.309	34	46.1	39.5
1.321	35	48.0	41.1
1.334	36	50.0	42.9
1.346	37	51.9	44.5
1.359	38	54.0	46.3
1.372	39	56.2	48.2
1.384	40	58.4	50.0
1.398	41	60.8	52.1
1.412	42	63.2	54.2
1.426	43	66.2	56.7
1.440	44	69.0	59.1
1.454	45	72.2	61.9
1.470	46	76.1	65.2
1.485	47	80.2	68.7
1.501	48	84.5	72.4
1.516	49	88.4	75.8
1.524	49.5	90.5	77.6
1.532	50	92.7	79.5
1.541	50.5	95.0	81.4
1.549	51	97.3	83.4
1.559	51.5	100.0	85.7

BLEACHING POWDER (CALCIUM HYPOCHLORITE)
SOLUTIONS, STRENGTH AND SPECIFIC
GRAVITY AT 15° C.

Specific Gravity	Degrees Bé.	Percentage Available Cl.
1.008	1	0.5
1.015	2	1.0
1.023	3	1.5
1.030	4	2.0
1.037	5	2.5
1.045	6	3.0
1.053	7	3.5
1.060	8	4.0
1.069	9.2	4.5
1.078	10.4	5.0
1.087	11.5	5.5
1.097	12.6	6.0
1.105	13.6	6.4

CALCIUM ACETATE SOLUTIONS.
SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Degrees Bé.	Percentage $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$.
1.0260	3.4	5
1.0530	7.1	10
1.0792	10.5	15
1.1051	13.6	20
1.1321	16.8	25
1.1594	19.8	30

TIN CRYSTALS (STANNOUS CHLORIDE) SOLUTION OF
STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Percentage Sn $\text{Cl}_2 + 2\text{H}_2\text{O}$.	Specific Gravity.	Percentage Sn $\text{Cl}_2 + 2\text{H}_2\text{O}$.
1.013	2	1.330	40
1.026	4	1.352	42
1.040	6	1.374	44
1.054	8	1.397	46
1.068	10	1.421	48
1.083	12	1.445	50
1.097	14	1.471	52
1.113	16	1.497	54
1.128	18	1.525	56
1.144	20	1.554	58
1.161	22	1.582	60
1.177	24	1.613	62
1.194	26	1.644	64
1.212	28	1.677	66
1.230	30	1.711	68
1.249	32	1.745	70
1.268	34	1.783	72
1.288	36	1.821	74
1.309	38	1.840	75

SODIUM BISULPHITE SOLUTIONS.
SPECIFIC GRAVITY AND STRENGTH AT 15° C.

Specific Gravity.	Degrees Bé.	Percentage.	
		NaHSO ₃ .	SO ₂
1.008	1	1.6	0.4
1.022	3	2.1	1.3
1.038	5	3.6	2.2
1.052	7	5.1	3.1
1.068	9	6.5	3.9
1.084	11	8.0	4.8
1.100	13	9.5	5.7
1.116	15	11.2	6.8
1.134	17	12.8	7.8
1.152	19	14.6	9.0
1.171	21	16.5	10.2
1.190	23	18.5	11.5
1.210	25	20.9	12.9
1.230	27	23.5	14.5
1.252	29	25.9	15.9
1.275	31	28.9	17.8
1.298	33	31.7	19.6
1.321	35	34.7	22.5
1.345	37	38.0	23.6

SODIUM ACETATE SOLUTIONS.
SPECIFIC GRAVITY AT 17.5° C.

Specific Gravity.	Percentage.	
	NaC ₂ H ₃ O ₂	NaC ₂ H ₃ O ₂ +3H ₂ O.
1.0150	3.015	5
1.0310	6.030	10
1.0470	9.045	15
1.0630	12.060	20
1.0795	15.075	25
1.0960	18.090	30
1.1130	21.105	35
1.1305	24.120	40
1.1485	27.135	45
1.1485	27.135	45
1.1670	30.150	50

ALUMINIUM CHLORIDE SOLUTIONS.
STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Percentage Al_2Cl_6	Specific Gravity.	Percentage Al_2Cl_6
1.00721	1	1.17092	22
1.01443	2	1.17953	23
1.02164	3	1.18815	24
1.02885	4	1.19676	25
1.03603	5	1.20584	26
1.04353	6	1.21493	27
1.05099	7	1.22406	28
1.05845	8	1.23310	29
1.06591	9	1.24219	30
1.07337	10	1.25184	31
1.08120	11	1.26149	32
1.08902	12	1.27115	33
1.09684	13	1.28080	34
1.10466	14	1.29046	35
1.11248	15	1.30066	36
1.12073	16	1.31086	37
1.12897	17	1.32106	38
1.13721	18	1.33126	39
1.14545	19	1.34146	40
1.15370	20	1.35224	41
1.16231	21	1.35359	41.126

SODA SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Degree Bé.	Percentage by weight	
		Na_2CO_3	$\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O}$
1.007	1	0.67	1.807
1.014	2	1.33	3.587
1.022	3	2.09	5.637
1.029	4	2.76	7.444
1.036	5	3.43	9.251
1.045	6	4.29	11.570
1.052	7	4.94	13.323
1.060	8	5.71	15.400
1.067	9	6.37	17.180
1.075	10	7.12	19.203
1.083	11	7.88	21.252
1.091	12	8.62	23.248
1.100	13	9.43	25.432
1.108	14	10.19	27.482
1.116	15	10.95	29.532
1.125	16	11.81	31.851
1.134	17	12.61	34.009
1.142	18	13.16	35.493
1.152	19	14.24	38.405

GLAUBER SALT SOLUTIONS—
SPECIFIC GRAVITY AT 19° C.

Specific gravity.	Percentage	
	$\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$	Na_2SO_4
1.0040	1	0.441
1.0079	2	0.881
1.0118	3	1.323
1.0158	4	1.764
1.0198	5	2.205
1.0238	6	2.646
1.0278	7	3.087
1.0318	8	3.528
1.0358	9	3.969
1.0398	10	4.410
1.0439	11	4.851
1.0479	12	5.292
1.0520	13	5.373
1.0560	14	6.174
1.0601	15	6.615
1.0642	16	7.056
1.0683	17	7.497
1.0725	18	7.938
1.0766	19	8.379
1.0807	20	8.820
1.0849	21	9.261
1.0890	22	9.702
1.0931	23	10.143
1.0973	24	10.584
1.1015	25	11.025
1.1057	26	11.466
1.1100	27	11.907
1.1142	28	12.348
1.1184	29	12.789
1.1226	30	13.230

SPECIFIC GRAVITY OF SULPHUROUS ACID 15° C.

Specific gravity.	Percentage SO ₂ .	Specific gravity.	Percentage SO ₂ .
1.0028	0.5	1.0302	5.5
1.0056	1.0	1.0328	6.0
1.0085	1.5	1.0353	6.5
1.0113	2.0	1.0377	7.0
1.0141	2.5	1.0401	7.5
1.0168	3.0	1.0426	8.0
1.0194	3.5	1.0450	8.5
1.0221	4.0	1.0474	9.0
1.0248	4.5	1.0497	9.5
1.0275	5.0	1.0520	10.0

SPECIFIC GRAVITY OF ACETIC ACID SOLUTIONS
15° C.

Specific gravity.	Percentage.	Specific gravity.	Percentage.
1.0007	1	1.0623	51
1.0022	2	1.0631	52
1.0037	3	1.0638	53
1.0052	4	1.0646	54
1.0067	5	1.0653	55
1.0083	6	1.0660	56
1.0098	7	1.0666	57
1.0113	8	1.0673	58
1.0127	9	1.0679	59
1.0142	10	1.0685	60
1.0157	11	1.0691	61
1.0171	12	1.0697	62
1.0185	13	1.0702	63
1.0200	14	1.0707	64
1.0214	15	1.0712	65
1.0228	16	1.0717	66

Specific gravity.	Percentage.	Specific gravity.	Percentage.
1.0242	17	1.0721	67
1.0256	18	1.0725	68
1.0270	19	1.0729	69
1.0284	20	1.0733	70
1.0298	21	1.0737	71
1.0311	22	1.0740	72
1.0324	23	1.0742	73
1.0337	24	1.0744	74
1.0350	25	1.0746	75
1.0363	26	1.0747	76
1.0375	27	1.0748	77
1.0388	28	1.0748	78
1.0400	29	1.0748	79
1.0412	30	1.0748	80
1.0424	31	1.0747	81
1.0436	32	1.0746	82
1.0447	33	1.0744	83
1.0459	34	1.0742	84
1.0470	35	1.0739	85
1.0481	36	1.0736	86
1.0492	37	1.0731	87
1.0502	38	1.0726	88
1.0513	39	1.0720	89
1.0523	40	1.0713	90
1.0533	41	1.0705	91
1.0543	42	1.0696	92
1.0552	43	1.0686	93
1.0562	44	1.0674	94
1.0571	45	1.0660	95
1.0580	46	1.0644	96
1.0589	47	1.0625	97
1.0598	48	1.0604	98
1.0607	49	1.0580	99
1.0615	50	1.0553	100

NOTE. The specific gravity 1.0553 may indicate either of two solutions of different strengths. To determine whether an acid is stronger than 78 per cent., (the maximum specific gravity) some water is added; if the specific gravity rises it is stronger if it falls it is weaker than 78 per cent. acid.

TARTARIC ACID SOLUTIONS—
SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Percentage.	Specific gravity.	Percentage.
1.0045	1	1.1505	30
1.0090	2	1.1615	32
1.0179	4	1.1726	34
1.0273	6	1.1840	36
1.0371	8	1.1959	38
1.0469	10	1.2078	40
1.0565	12	1.2198	42
1.0661	14	1.2317	44
1.0761	16	1.2441	46
1.0865	18	1.2568	48
1.0969	20	1.2696	50
1.1072	22	1.2828	52
1.1175	24	1.2961	54
1.1282	26	1.3093	56
1.1393	28	1.3220	57.9

Saturated.

TANNIN SOLUTIONS—
SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Percentage.	Specific gravity.	Percentage.
1.0040	1.0	1.0140	3.5
1.0044	1.1	1.0144	3.6
1.0048	1.2	1.0148	3.7
1.0052	1.3	1.0152	3.8
1.0056	1.4	1.0156	3.9
1.0060	1.5	1.0160	4.0
1.0064	1.6	1.0164	4.1
1.0068	1.7	1.0168	4.2
1.0072	1.8	1.0172	4.3
1.0076	1.9	1.0176	4.4
1.0080	2.0	1.0180	4.5
1.0084	2.1	1.0184	4.6
1.0088	2.2	1.0188	4.7
1.0092	2.3	1.0192	4.8
1.0096	2.4	1.0196	4.9
1.0100	2.5	1.0200	5.0
1.0104	2.6	1.0242	6.0
1.0108	2.7	1.0242	6.0
1.0112	2.8	1.0324	8.0
1.0116	2.9	1.0406	10.0
1.0120	3.0	1.0489	12.0
1.0124	3.1	1.0572	14.0
1.0128	3.2	1.0656	16.0
1.0132	3.3	1.0740	18.0
1.0136	3.4	1.0824	20.0

COMMON SALT SOLUTIONS—

SPECIAL GRAVITY AT 15° C.

Specific gravity.	Per cent. NaCl.	Specific gravity.	Per cent. NaCl.
1.00725	1	1.10384	14
1.01450	2	1.11146	15
1.02174	3	1.11938	16
1.02899	4	1.12730	17
1.03624	5	1.13523	18
1.04366	6	1.14315	19
1.05108	7	1.15107	20
1.05851	8	1.15931	21
1.06593	9	1.16755	22
1.07335	10	1.17580	23
1.08097	11	1.18404	24
1.08859	12	1.19228	25
1.09622	13	1.20098	26

ALUMINIUM SULPHATE SOLUTIONS—

STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Percentage $\text{Al}_2(\text{SO}_4)_3$.	Specific gravity.	Percentage $\text{Al}_2(\text{SO}_4)_3$.
1.0170	1	1.1467	14
1.0210	2	1.1574	15
1.0370	3	1.1668	16
1.0470	4	1.1770	17
1.0569	5	1.1876	18
1.0670	6	1.1971	19
1.0768	7	1.2074	20
1.0870	8	1.2168	21
1.0968	9	1.2274	22
1.1071	10	1.2375	23
1.1171	11	1.2473	24
1.1270	12	1.2573	25
1.1369	13		

ALUMINIUM NITRO-ACETATE SOLUTIONS—
SPECIFIC GRAVITY AND STRENGTH AT 17° C.

Specific gravity.	Degrees Bé.	Percentage Al_2O_3 .
1.012	1.6	0.5
1.025	3.4	1.0
1.039	5.3	1.5
1.054	7.2	2.0
1.068	9.1	2.5
1.083	11.0	3.0
1.097	12.7	3.5
1.112	14.4	4.0
1.126	16.1	4.5
1.141	17.8	5.0
1.156	19.4	5.5
1.160	19.8	5.64

ALUMINIUM ACETATE SOLUTIONS—
STRENGTH AND SPECIFIC GRAVITY AT 17° C.

Specific gravity.	Degrees Bé.	Percentage Al_2O_3 .
1.012	1.6	0.5
1.025	3.4	1.0
1.038	5.0	1.5
1.050	6.7	2.0
1.062	8.3	2.5
1.074	9.9	3.0
1.086	11.3	3.5
1.098	12.8	4.0
1.100	13.0	4.5

TARTAR EMETIC SOLUTIONS—

STRENGTH AND SPECIFIC GRAVITY AT 17.5° C.

Specific gravity.	Percentage $\text{SbOKC}_4\text{H}_4\text{O}_6$ $+ \frac{1}{2}\text{H}_2\text{O}$.	Specific gravity.	Percentage $\text{SbOKC}_4\text{H}_4\text{O}_6$ $+ \frac{1}{2}\text{H}_2\text{O}$.
1.005	0.5	1.022	3.5
1.007	1.0	1.027	4.0
1.009	1.5	1.031	4.5
1.012	2.0	1.035	5.0
1.015	2.5	1.038	5.5
1.018	3.0	1.044	6.0

STANNIC CHLORIDE SOLUTIONS—

STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific gravity.	Percentage $\text{SnCl}_4 + 5\text{H}_2\text{O}$.	Specific gravity.	Percentage $\text{SnCl}_4 + 5\text{H}_2\text{O}$.
1.012	2	1.366	50
1.024	4	1.386	52
1.036	6	1.406	54
1.048	8	1.426	56
1.059	10	1.447	58
1.072	12	1.468	60
1.084	14	1.491	62
1.097	16	1.514	64
1.110	18	1.538	66
1.124	20	1.563	68
1.137	22	1.587	70
1.151	24	1.614	72
1.165	26	1.641	74
1.180	28	1.669	76
1.195	30	1.698	78
1.210	32	1.727	80
1.227	34	1.759	82
1.242	36	1.791	84
1.259	38	1.824	86
1.276	40	1.859	88
1.293	42	1.893	90
1.310	44	1.932	92
1.329	46	1.969	94
1.347	48	1.988	96

AREOMETRY OR HYDROMETRY.

COMPARISON BETWEEN THE SPECIFIC GRAVITY OF BEAUME AND
TWADDLE.

Tw.	B.	Sp.Gr.	Tw.	B.	Sp.Gr.	Tw.	B.	Sp.Gr.	Tw.	B.	Sp.Gr.
0	0	1.000	44	26.0	1.220	88	44.1	1.440	132	57.4	1.660
1	0.7	1.005	45	26.4	1.225	89	44.4	1.445	133	57.7	1.665
2	1.4	1.010	46	26.9	1.230	90	44.8	1.450	134	57.9	1.670
3	2.1	1.015	47	27.4	1.235	91	45.1	1.455	135	58.2	1.675
4	2.7	1.020	48	27.9	1.240	92	45.4	1.460	136	58.4	1.680
5	3.4	1.025	49	28.4	1.245	93	45.8	1.465	137	58.7	1.685
6	4.1	1.030	50	28.8	1.250	94	46.1	1.470	138	58.9	1.690
7	4.7	1.035	51	29.3	1.255	95	46.4	1.475	139	59.2	1.695
8	5.4	1.040	52	29.7	1.260	96	46.8	1.480	140	59.5	1.700
9	6.0	1.045	53	30.2	1.265	97	47.1	1.485	141	59.7	1.705
10	6.7	1.050	54	30.6	1.270	98	47.4	1.490	142	60.0	1.710
11	7.4	1.055	55	31.1	1.275	99	47.8	1.495	143	60.2	1.715
12	8.0	1.060	56	31.5	1.280	100	48.1	1.500	144	60.4	1.720
13	8.7	1.065	57	32.0	1.285	101	48.4	1.505	145	60.6	1.725
14	9.4	1.070	58	32.4	1.290	102	48.7	1.510	146	60.9	1.730
15	10.0	1.075	59	32.8	1.295	103	49.0	1.515	147	61.1	1.735
16	10.6	1.080	60	33.3	1.300	104	49.4	1.520	148	61.4	1.740
17	11.2	1.085	61	33.7	1.305	105	49.7	1.525	149	61.6	1.745
18	11.9	1.090	62	34.2	1.310	106	50.0	1.530	150	61.8	1.750
19	12.4	1.095	63	34.6	1.315	107	50.3	1.535	151	62.1	1.755
20	13.0	1.100	64	35.0	1.320	108	50.6	1.540	152	62.3	1.760
21	13.6	1.105	65	35.4	1.325	109	50.9	1.545	153	62.5	1.765
22	14.2	1.110	66	35.8	1.330	110	51.2	1.550	154	62.8	1.770
23	14.9	1.115	67	36.2	1.335	111	51.5	1.555	155	63.0	1.775
24	15.4	1.120	68	36.6	1.340	112	51.8	1.560	156	63.2	1.780
25	16.0	1.125	69	37.0	1.345	113	52.1	1.565	157	63.5	1.785
26	16.5	1.130	70	37.4	1.350	114	52.4	1.570	158	63.7	1.790
27	17.1	1.135	71	37.8	1.355	115	52.7	1.575	159	64.0	1.795
28	17.7	1.140	72	38.2	1.360	116	53.0	1.580	160	64.2	1.800
29	18.3	1.145	73	38.6	1.365	117	53.3	1.585	161	64.4	1.805
30	18.8	1.150	74	39.0	1.370	118	53.6	1.590	162	64.6	1.810
31	19.3	1.155	75	39.4	1.375	119	53.9	1.595	163	64.8	1.815
32	19.8	1.160	76	39.8	1.380	120	54.1	1.600	164	65.0	1.820
33	20.3	1.165	77	40.1	1.385	121	54.4	1.605	165	65.2	1.825
34	20.9	1.170	78	40.5	1.390	122	54.7	1.610	166	65.5	1.830
35	21.4	1.175	79	40.8	1.395	123	55.0	1.615	167	65.7	1.835
36	22.0	1.180	80	41.2	1.400	124	55.2	1.620	168	65.9	1.840
37	22.5	1.185	81	41.6	1.405	125	55.5	1.625	169	66.1	1.845
38	23.0	1.190	82	42.0	1.410	126	55.8	1.630	170	66.3	1.850
39	23.5	1.195	83	42.3	1.415	127	56.0	1.635	171	66.5	1.855
40	24.0	1.200	84	42.7	1.420	128	56.3	1.640	172	66.7	1.860
41	24.5	1.205	85	43.1	1.425	129	56.6	1.645	173	67.0	1.865
42	25.0	1.210	86	43.4	1.430	130	56.9	1.650			
43	25.5	1.215	87	43.8	1.435	131	57.1	1.655			

If the sample is too viscous to determine the density directly, a weighed portion of it can be first diluted with a weighed quantity of water, or a weighed portion can be dissolved and diluted to a known volume with water. In the first instance the per cent. of total solids is to be calculated by the following formula:

$$\text{Per cent. of solids in the undiluted material} = \frac{WS}{W}$$

S = per cent. of solids in the diluted material.

W = weight of the diluted material.

w = weight of the sample taken for dilution.

If the dilution was made to a definite volume, the following formula is to be used:

$$\text{Per cent. of solids in the undiluted material} = \frac{VDS}{W}$$

V = volume of the diluted solution.

D = specific gravity of the diluted solution.

S = per cent. of solids in the diluted solution.

w = weight of the sample taken for dilution.

To reduce a liquid to a desired specific gravity:

Let v equal the volume of the first liquid.

Let B " " Beaumé of the first liquid.

Let b " " Beaumé of the second or reducing liquid.

Let a " " Beaumé required.

Let z " " volume of the reducing liquid.

$$z = \frac{av - vB}{b - a}$$

TO CHANGE FROM TWADDLE TO SPECIFIC GRAVITY,

or

TO CHANGE FROM SPECIFIC GRAVITY TO TWADDLE.

In order to change degrees Twaddle into specific gravity, multiply by 5, add 1,000, and divide by 1,000. Example: Change 168° Twaddle into specific gravity.

$$\begin{array}{r}
 168 \times 5 \\
 \hline
 840 \\
 1,000 \\
 \hline
 1,000 \overline{)1.840} \\
 \hline
 1.84 \text{ Spec. Grav.}
 \end{array}$$

To change specific gravity into degrees Twaddle, multiply by 1,000, subtract 1,000, and divide by 5. Example: Change 1.84 specific gravity into degrees Twaddle.

$$\begin{array}{r}
 1.84 \times 1,000 \\
 \hline
 1,840 \\
 1,000 \\
 \hline
 5 \overline{) 840} \\
 \hline
 168^\circ \text{ Tw.}
 \end{array}$$

The degrees of Twaddle's hydrometer are easily turned into specific gravity numbers—a quality which makes it preferable to any other hydrometer in use. The rule is to multiply the indicated degree by 5, and add 1,000 to the product; for example, 9 degrees Twaddle equals specific gravity 1,045; 25 degrees Twaddle equals specific gravity 1,125; 100 degrees Twaddle equals specific gravity 1,500; and so on. To bring specific gravity numbers to degrees of Twaddle, subtract 1,000, and divide the remainder by 5; for example: specific gravity 1.000 equals 20 degrees Twaddle.

WATER ANALYSIS.

Analyses of water are sometimes reported as parts per million, and sometimes grains per imperial gallon, and sometimes grains per United States gallon. The following table gives all three values :

Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
1	0.0700	0.0583	51	3.5700	2.9742
2	0.1400	0.1166	52	3.6400	3.0325
3	0.2100	0.1749	53	3.7100	3.0908
4	0.2800	0.2332	54	3.7800	3.1491
5	0.3500	0.2915	55	3.8500	3.2074
6	0.4200	0.3499	56	3.9200	3.2658
7	0.4900	0.4082	57	3.9900	3.3241
8	0.5600	0.4665	58	4.0600	3.3824
9	0.6300	0.5248	59	4.1300	3.4407
10	0.7000	0.5831	60	4.2000	3.4990
11	0.7700	0.6414	61	4.2700	3.5573
12	0.8400	0.6998	62	4.3400	3.6157
13	0.9100	0.7581	63	4.4100	3.6740
14	0.9800	0.8165	64	4.4800	3.7323
15	1.0500	0.8747	65	4.5500	3.7909
16	1.1200	0.9330	66	4.6200	3.8489
17	1.1900	0.9914	67	4.6900	3.9073
18	1.2600	1.0497	68	4.7600	3.9656
19	1.3300	1.1080	69	4.8300	4.0239
20	1.4000	1.1663	70	4.9000	4.0822
21	1.4700	1.2246	71	4.9700	4.1405
22	1.5400	1.2829	72	5.0400	4.1988
23	1.6100	1.3413	73	5.1100	4.2575
24	1.6800	1.3996	74	5.1800	4.3155
25	1.7500	1.4579	75	5.2500	4.3738
26	1.8200	1.5162	76	5.3200	4.4321
27	1.8900	1.5745	77	5.3900	4.4904
28	1.9600	1.6329	78	5.4600	4.5488
29	2.0300	1.6912	79	5.5300	4.6071
30	2.1000	1.7495	80	5.6000	4.6654
31	2.1700	1.8078	81	5.6700	4.7237
32	2.2400	1.8661	82	5.7400	4.7820
33	2.3100	1.9244	83	5.8100	4.8403
34	2.3800	1.9828	84	5.8800	4.8987
35	2.4500	2.0411	85	5.9500	4.9570
36	2.5200	2.0994	86	6.0200	5.0154
37	2.5900	2.1577	87	6.0900	5.0736

38	2.6600	2.2160	88	6.1600	5.1319
39	2.7300	2.2745	89	6.2300	5.1903
40	2.800	2.3327	90	6.3000	5.2486
41	2.8700	2.3910	91	6.3700	5.3069
42	2.9400	2.4493	92	6.4400	5.3652
43	3.0100	2.5076	93	6.5100	5.4235
44	3.0800	2.5659	94	6.5800	5.4818
45	3.1500	2.6243	95	6.6500	5.5402
46	3.2200	2.6826	96	6.7200	5.5985
47	3.2900	2.7409	97	6.7900	5.6568
48	3.3600	2.7992	98	6.8600	5.7151
49	3.4300	2.8575	99	6.9300	5.7734
50	3.5000	2.9129	100	7.0000	5.8318

SYMBOLS AND ATOMIC WEIGHTS OF THE ELEMENTS.

NAME. SYMBOL. ATOMIC WEIGHT.

Clarke.

H = 1. O = 16. Richards. German.

Aluminium	.....Al....	26.9	27.1	27.1	27.1
Antimony	.....Sb....	119.5	120.4	120.0	120.
Argon	.....A....	?	?	39.9?	40.
Arsenic	.....As....	74.45	75.0	75.0	75.
Barium	.....Ba....	136.4	137.40	137.43	137.4
Bismuth	.....Bi....	206.5	208.1	208.0	208.5
Boron	.....B....	10.9	11.0	10.95	11.
Bromine	.....Br....	79.34	79.95	79.955	79.96
Cadmium	.....Cd....	111.55	112.4	112.3	112.
Caesium	.....Cs....	131.9	132.9	132.9	133.
Calcium	.....Ca....	39.8	40.1	40.1	40.
Carbon	.....C....	11.9	12.0	12.001	12.00
Cerium	.....Ce....	138.0	139.0	140.	140.
ChlorineCl....	35.18	35.45	35.455	35.45
ChromiumCr....	51.7	52.1	52.14	52.1
CobaltCo....	58.55	59.00	59.00	59.

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NAME. SYMBOL. ATOMIC WEIGHT.

Clarke.

H = 1. O = 16. Richards. German.

Columbium	Nb	93.0	93.7	94.	94.
(Niobium)					
Copper	Co	63.1	63.6	63.60	63.6
Erbium	Er	164.7	166.0	166.	166.
Fluorine	F	18.9	19.05	19.05	19.
Gadolinium	Gd	155.8	157.0	156. ?	...
Gallium	Ga	69.5	70.0	70.0	70.
Germanium	Ge	71.9	72.5	72.5	72.
Glucium	Be	9.0	9.1	9.1	9.1
(Beryllium)					
Gold	An	195.7	197.2	197.3	197.2
Helium	He	?	?	4.0?	4.
Hydrogen	H	1.000	1.008	1.0075	1.01
Indium	In	113.1	114.0	114.	114.
Iodine	I	125.89	126.85	126.85	126.85
Iridium	Ir	191.7	193.1	193.0	193.
Iron	Fe	55.46	55.88	56.0	56.
Krypton	Kr	...	...	...	81.8
Lanthanum	La	137.6	138.6	138.5	138.
Lead	Pb	205.36	206.92	206.92	206.9
Lithium	Li	6.97	7.03	7.03	7.03
Magnesium	Mg	24.1	24.3	24.36	24.36
Manganese	Mn	54.6	55.0	55.02	55.
Mercury	Hg	198.50	200.0	200.0	200.3
Molybdenum	Mo	95.3	96.0	96.0	96.
Neodymium	Nd	142.5	143.6	143.6	144.
Neon	Ne	...	...	...	120.
Nickel	Ni	58.25	58.70	58.70	58.7
Nitrogen	N	13.93	14.04	14.045	14.04
Osmium	Os	189.6	191.0	190.8	191.
Oxygen	O	15.88	16.000	16.0000	16.00
Palladium	Pd	106.2	107.0	106.5	106.
Phosphorus	P	30.75	31.0	31.0	31.

NAME. SYMBOL. ATOMIC WEIGHT.

Clarke.

H = 1. O = 16. Richards. German.

Platinum	Pt....	193.4	194.9	195.2	194.8
Potassium	K....	38.82	39.11	39.140	39.15
Praseodymium	Pr....	139.4	140.5	140.5	140.
Rhodium	Rh....	102.2	103.0	103.0	103.
Rubidium	Rb....	84.75	85.4	85.44	85.4
Ruthenium	Ru....	100.9	101.7	101.7	101.7
Samarium	Sa....	149.2	150.3	150.0	150.
Scandium	Sc....	43.8	44.1	44.	44.1
Selenium	Se....	78.6	79.2	79.2	79.1
Silicon	Si....	28.2	28.4	28.4	28.4
Silver	Ag....	107.11	107.92	107.930	107.93
Sodium	Na....	22.88	23.05	23.050	23.05
Strontium	St....	86.95	87.60	87.68	87.6
Sulfur	S....	31.83	32.07	32.065	32.06
Tantalum	Ta....	181.5	182.8	183.	183.
Tellurium	Te....	126.5	127.5 ?	127.5 ?	127.
Terbium	Tr....	158.8	160.	160.	...
Thallium	Tl....	202.61	204.15	204.15	204.1
Thorium	Th....	230.8	232.6	233.	232.
Thulium	Tu....	169.4	170.7	170. ?	...
Tin	Sn....	118.1	119.0	119.0	118.5
Titanium	Ti....	47.8	48.15	48.17	48.1
Tungsten	W....	182.6	184.	184.4	184.
Uranium	U....	237.8	239.6	240.	239.5
Vanadium	V....	51.0	51.4	51.4	51.2
Xenon	X....	...	...	...	128.
Ytterbium	Yb....	171.9	173.2	173.	173.
Yttrium	Y....	88.3	89.0	89.0	89.
Zinc	Zn....	64.9	65.4	65.40	65.4
Zirconium	Zr....	89.7	90.4	90.5	90.6



PART II.



CHEMICAL TERMS.



CHEMICAL TERMS.

(FOR DEFINITIONS SEE VOL. 3.)

The newer chemical names vary little in the four languages, the principal difference being in the terminations with some slight modification in the spelling. Example, English, aniline; German, anilin; French, aniline; Spanish, anilina. These terms being so nearly alike are for the most part omitted from the following list:

English.	German.
Acetic acid,	Essigsäure,
Acid Alizarine colors,	Säurealizarinfarbstoffe,
Albumen,	Albumin,
Alcohol,	Alkohol,
Alizarine,	Alizarin,
Alizarine colors,	Alizarinfarbstoffe,
Alum,	Alaun,
Aluminium,	Aluminum,
Ammonia,	Ammoniak,
Aniline black,	Anilinschwarz,
Aniline colors,	Anilinfarben.
Antimony,	Antimonium,
Archil,	Orseille,
Arseniates,	Arsensäuresalze,
Arsenic,	Arsen,
Arsenic acid,	Arsensäure,
Arsenious acid,	Arsenigsäure,
Asbestos,	Asbest,
Azo colors,	Azofarbstoffe,
Barium,	Baryum,
Barytes,	Schwerspath,
Benzoic acid,	Benzoessäure,
Black,	Schwarz,
Blood albumen,	Blutalbumin,
Blue.	Blau,
Blue vitriol,	Kupfervitriol,
Boracic acid,	
Boric acid,	Borsäure,
Brass,	Messing.
Brimstone,	Schwefel,

French.	Spanish.
Acide acétique,	Acido acetico,
Albumine,	Albumina,
Alcool,	Alcohol,
Alizarine,	Alizarina,
Couleurs d'alizarine,	Colores de alizarina,
Alun,	Alumbre,
Aluminium	Aluminio,
Ammoniaque,	Amoniaco,
Noir d'aniline,	Negro de anilina,
Couleurs d'anilin,	Colores de anilina,
Antimoine,	Antimonio,
Orseille,	Orchilla,
Arséniates,	Arseniatos,
Arsénic,	Arsenico,
Acide arsénique,	Acido arsenico,
Acide arsénieux,	Acido arsenioso,
Amiante,	Amianto,
Couleurs azoïques,	Colores azoicos,
Baryum,	Barita,
Baryte,	Espato pesado,
Acide benzoïque,	Acido benzoico,
Noir,	Negro,
Albumine de sang.	Albumina de sangre,
Bleu,	Azul,
Vitriol bleu,	Sulfato de cobre,
Acide borique,	Acido borico,
Laiton,	Laton,
Soufre,	Azulfre.

English.	German.
Bromine,	Brom,
Brown,	Braun,
Butyric acid,	Buttersäure,
Camwood,	Angolaholz,
Carbolic acid,	Carbolsäure,
Castor oil,	Ricinusöl,
Caustic potash,	Aetzkali,
Caustic soda,	Kaustische soda,
Chalk,	Kreide,
Chestnut extract,	Kastanienholz extract,
Chloric acid,	Chlorsäure,
Chlorine,	Chlor,
Chrome alum,	Chromalaun,
Chrome yellow,	Chromgelb,
Chromic acid,	Chromsäure,
Chromium,	Chrom,
Citric acid,	Citronensäure,
Clay,	Thon,
Coal,	Steinkohlen,
Coal-tar,	Steinkohlenteer,
Color,	Farbe.
Copper,	Kupfer,
Copperas,	Eisenvitriol,
Cork,	Kork,
Cotton,	Baumwolle,
Cudbear,	Persio,
Cyanic acid,	Cyansäure,
Dextrine,	Dextrin,
Diamine,	Diamin,

French.	Spanish.
Brome,	Bromo,
Brun,	Pardo,
Acide butyrique,	Acido butirico,
Bois de cam,	Palo de cam,
Acide phenique,	Acido fenico,
Huile de ricin,	Aceite de ricino,
Potasse caustique,	Potasa caustica,
Soude caustique,	Sosa caustica,
Craie,	Creta,
Extrait de bois de châtaignier,	Extracto de madera de castaño,
Acide chlorique,	Acide clorico,
Chlore,	Cloro,
Alun de chrôme,	Alumbre de cromo,
Jaune de chrome,	Amarillo de cromo,
Acide chromique,	Acido cromico,
Chrôme,	Cromo,
Acide citrique,	Acido citrico,
Argile,	Arcilla,
Houille,	Hulla,
Gondron de houille,	Brea de hulla,
Couleur,	Color,
Cuivre,	Cobre,
Couperose,	Capparrosa,
Liege,	Corcha,
Coton,	Algodon,
Acide cyanique,	Acido sianato,
Dextrine,	Dextrina,
Diamine,	Diamina,

English.	German.
Dianisidine,	Dianisidin,
Didymium,	Didym,
Dyestuffs,	Farbstoffe,
Dyewoods.	Farbhölzer,
Dyer's oil,	Färberöl,
Egg albumen,	Eialbumin,
Emery,	Schmirgel,
Enamels,	Emaillen,
Epsom salt,	Bittersalz,
Erbium,	Erbium,
Ether,	Aether,
Ethyltartaric acid,	Aethylweinsäure,
Fats,	Fette,
Feldspar,	Feldspath,
Felt,	Filz,
Ferricyanides,	Ferricyanürsalze,
Ferrocyanides,	Ferricyanürsalze,
Fixing salt,	Fixisalz,
Flint,	Feuerstein,
Fluorides,	Fluorsalze,
Formic acid,	Ameisensäure,
Fuller's earth,	Walkerde,
Fulling soaps,	Walkseifen,
Fustic extract,	Gelbholz extract,
Gallnuts,	Galläpfel,
Gambier,	Gambir,
Gas,	Gas,
Gelatine,	Gelatine,
Glass,	Glas,

French.	Spanish.
Dianisidine,	Dianisidina,
Didyme,	Didimo,
Matières colorantes,	Sustancias colorativas,
Bois de teinture,	Palos de tinte,
Huile tournante fixée,	Aceite de tintura,
Albumine de oeufs,	Albumina de huevos,
Emeri,	Esmeril,
Emaux,	Esmaltes,
Sulfate de magnésie,	Sulfato de magnesio,
Erbium,	Erbio,
Ether,	Eter,
Acide éthyltartarique,	Acido etiltartarico,
Graisses,	Grasas,
Feldspath,	Feldspato,
Feutre,	Fieltro,
Ferricyanures, .	Ferrisianuros,
Ferrocyanures,	Ferrosianuros,
Sel fixatif,	Sal fijadura,
Pierre à feu,	Piedra de lumbre,
Fluorures,	Fluoruros,
Acide formique,	Acid formico,
Terre à foulon,	Terra de batanar,
Savons à foulon,	Jabones para batanar,
Extrait de bois jaune,	Extracto de palo brasil amarillo,
Noix de galles,	Agallas,
Gambier,	Gambir,
Gaz,	Gas,
Gélatine,	Gelatina,
Verre,	Vidrio,

English.	German.
Glucose—See grape sugar,	
Glue,	Leim,
Glycerine,	Glycerin,
Gold,	Gold,
Grape sugar,	Traubenzucker,
Gray,	Graue,
Green,	Grün,
Green earth,	Grüne erde,
Green vitriol,	Eisenvitriol,
Gum arabic,	Gummi arabigum,
Gypsum,	Gyps,
Hair,	Haar,
Hydrobromic acid,	Bromwasserstoffsäure,
Hydrochloric acid,	Salzsäure,
Hydrocyanic acid,	Blausäure,
	Cyanwasserstoffsäure,
Hydrofluoric acid,	Flusssäure,
	Fluorwasserstoffsäure,
Hydrogen.	Wasserstoff,
Hydroquinone,	Hydrochinon,
Hypochlorous acid,	Unterchlorigsäure,
Hyposulphurous acid,	Unterschweifigesäure,
India rubber,	Kautschuk,
Indigo,	Indigo,
Indigo carmine,	Indigo carmin,
Indigo synthetic,	Synthetischer Indigo,
Indigo white,	Indigweiss,
Inks,	Tinten.
Iodides,	Jodsalze,
Iodine,	Jod.

French.

Spanish,

Colle,
Glycérine,
Or,
Glucose,
Gris,
Vert,
Terre verte,
Vitriol vert
Gomme arabique,
Gypse,
Poil,
Acide hydrobromique,
Acide chlorhydrique,
Acide cyanhydrique,

Acide fluorhydrique,

Hydrogene,
Hydroquinone,
Acide hypochloreux,
Acide hyposulfureux,

Indigo,
Carmin d'indigo,
Indigo synthétique,
Blanc d'indigo,
Encres,
Iodures,
Iode,

Cola.
Glicerina,
Oro,
Glucosa,
Gris,
Verde,
Tierra verde.
Vitriolo de hierro.
Goma arabiga,
Yeso,
Pelo,
Acido hidrobromico,
Acido clorhidrico,
Acido prusico,

Acido fluorhidrico.

Hidrogeno,
Hidroquinona,
Acido hipocloroso.
Acido hiposulfuroso.

Añil.
Carmin de añil,
Añil sintético,
Blanco de añil,
Tintas,
Yoduros.
Yodo.

English.	German.
Iron,	Eisen,
Iron liquor,	Eisenbeize,
Jute,	Jute,
Kaolin,	Kaolin,
Lactic acid,	Milchsäure,
Lakes,	Lacke,
Lead,	Blei,
Leather,	Leder,
Levulose,	Lävulose,
Lignorosine,	Lignorosin,
Lime,	Kalk,
Linen,	Lein.
Linseed oil,	Leinöl,
Litharge,	Bleiglätte,
Lithium,	Lithium,
Logwood,	Blauholz.
Logwood extract,	Blauholzextract,
Madder,	Röthe,
Magnesium,	Magnesium,
Manganese,	Mangan,
	Braunstein,
Marble,	Marmor,
Maroon,	Marron,
Mercury,	Quecksilber,
Mimosa-bark,	Mimosenrinde,
Mohair,	Mohr,
Mordants,	Beizen,
Myrobalans,	Myrobalanen,
Neatsfoot oil,	Klanenöl,

French.	Spanish.
Fer,	Hierro,
Gris de fer,	Mordiente de hierro,
Jute,	Yute.
Kaolin,	Kaolin,
Acide lactique,	Acido lactico,
Laques,	Lacas,
Plomb,	Plomo,
Cuir,	Cuero,
Lévulose,	Levúlosa,
Lignorosine,	Lignorosina,
Chaux,	Cal,
Lin,	Lino,
Huile de lin,	Aceite de lino,
Litharge,	Litargirio,
Lithine,	Litina,
Bois de campêche,	Palo de campeche,
Extrait de campêche,	Extracto de campêche,
Garance,	Granza,
Magnésie,	Magnesio,
Manganèse,	Manganesa,
Marbre,	Marmol,
Marron,	Marron,
Mercure,	Mercurio,
Ecorce de mimose,	Corteza de mimosa,
Moire,	Moare,
Mordants,	Mordientes,
Myrobalans,	Miobalanos,
Huile de pieds,	Aceite de pezuna,

English.	German.
Nickel,	Nickel.
Nitric acid,	Saltpetersäure,
Nitrous acid,	Saltpetrigsäure,
Oak bark,	Eichenrinde,
Oils,	Oele,
Old fustic,	Gelbholz,
Oleic acid.	Oelsäure,
Olive oil,	Olivenöl,
Orange,	Orange,
Oxalic acid,	Oxalsäure,
Oxides,	Oxyde,
Oxygen,	Sauerstoff.
Palm oil,	Palmöl,
Paper,	Papier,
Paraffine,	Paraffin,
Parchment,	Pergament,
Perchloric acid,	Ueberchlorsäure.
Permanganate of Potash,	Uebermangansäureskalium,
Peroxide of hydrogen,	Wasserstoffsuperoxyd,
Persulphate of ammonia,	Ueberschwefelsäure am-
Phosphoric acid,	monium,
Phosphorus,	Phosphorsäure,
Pigments,	Phosphor,
Pink salt,	Pigmente,
Pitch,	Pinksalz,
Platinum,	Pech,
Potash,	Platin,
Potassium,	Potassche,
	Kalium,

French.	Spanish.
Nickel,	Niquel,
Acide nitrique,	Acido nitrico.
Acide nitreux.	Acido nitroso,
Ecorce de chœur,	Corteza de roble,
Huiles,	Aceites,
Bois jaune,	Palo brasil amarillo,
Acide oléique,	Acido oleico,
Huile d'olives,	Aceite de olivas,
Orangé,	Naranjo,
Acide oxalique,	Acido oxalico,
Oxydes,	Oxidos,
Oxygène,	Oxigeno,
Huile de palme,	Aceite de palma.
Papier,	Papel,
Paraffine,	Paraffina,
Parchemin,	Pergamino,
Acide perchlorique,	Acido perchlorico,
Permanganate de potasse,	Permanganato de potasa,
Peroxyde d'hydrogène.	Peroxido de hidrogeno,
Eau oxygénée,	Agua oxigenada,
Persulfate d'ammoniaque,	Persulfato de ammoniaco.
Acid phosphorique,	Acido fosforico,
Phosphore,	Fosforo,
Pigments,	Pimentos,
Bichlorure d'étain,	Bicloruro de estaño,
Poix,	Pez,
Platine,	Platino,
Potasse,	Potasa,
Potassium,	Potasio,

English.	German.
Potato starch,	Kartoffelstärke,
Protochloride of tin,	Zinn chlorür,
Prussian Blue,	Preussischblau,
Purple,	Purpur,
Pyroligues acid,	Holzessigsäure.
Pyrogallie acid,	Pyrogallussäure,
Quartz,	Quarz,
Quebracho,	Quebracho,
Quercitron,	Quercitron,
Quicksilver,	Quecksilber,
Quinoline,	Chinolin,
Red,	Roth.
Red oil,	Rothöl,
Redwood,	Rothholz,
Resin,	Harz,
Resorcine,	Resorcin,
Rhodium,	Rhodium,
Rocksalt,	Steinsalz,
Sal ammoniac,	Salmiak,
Salicylic acid,	Salicylsäure,
Salt, common,	Kochsalz,
Saltpeter,	Salpeter,
Scouring soap,	Reibseife.
Shellac,	Schellack,
Silk,	Seide,
Soap,	Seife.
Soda,	Soda,

French.	Spanish.
Amidon de pommes de terre,	Almidon de patatas,
Protochlorure d' étain,	Protocloruro de estaño,
Bleu de Prusse,	Azul de Prusia,
Pourpre,	Purpura,
Acid pyroligneux,	Acido pirolignoso,
Acide pyrogallique,	Acido pirogalico,
Quartz,	Cuarzo,
Québracho,	Quebracho,
Quercitron,	Quercitron,
Mercure,	Azogue,
	Mercurio,
Quinoline,	Quinolina,
Rouge,	Rojo,
Huilo rouge,	Aceitorojo,
Bois rouge,	Leño rojo,
Bois de Brésil,	
Résine,	Resina,
Résorcine,	Resorcina,
Rhodium,	Rhodio,
Sel gemme,	Sal piedra,
Sel ammoniacque,	Sal ammoniaco,
Acide salicylique,	Acido salicilico,
Sel commun,	Sal comun,
Salpêtre,	Salitre,
Savon á dégraisser,	Jabon sacamanchas,
Gomme laque,	Goma laca,
Soie,	Seda,
Savon,	Jabon,
Soude,	Sosa,

English.	German.
Soda, calcined,	Calcinierte soda,
Sodium,	Natrium,
Spirit colors,	Spiritfarben,
Sannate of soda,	Zinnsäuresnatrium,
Starch,	Stärke,
Stone,	Stein,
Straw,	Stroh,
Strontium,	Strontium,
Sulphates,	Schwefelsaure Salze,
Sulphides,	Schwefelsalze,
Sulphites,	Schwefligsaure Salze,
Sulphocyanides,	Rodansalze,
Sulphur,	Schwefel,
Sulphuric acid,	Schwefelsäure,
Sulphurous acid,	Schwefligsäure,
Tallow,	Talg,
Tannic acid,	Gerbsäure,
Tannin,	Tannin,
Tannin extracts,	Gerbstoffextracte,
Tar,	Theer,
 Tartar,	 Weinstein,
Tartar emetic,	Brechweinstein,
Tartaric acid,	Weinsteinsäure,
Textile soaps,	Textilseifen,
 Tin,	 Zinn,
Tin chloride,	Zinnchlorid,
Tin crystals,	Zinnsalz,
Tragacanth gum,	Tragantgummi,

French.	Spanish.
Soude calcinée,	Sosa calcinada,
Sodium,	Sodio ,
Couleurs à l' alcool.	Colores al alcohol,
Stannate de soude,	Estanato de sosa,
Amidon,	Almidon,
Pierre,	Piedra,
Paille,	Paja,
Strontiane,	Estronciana,
Sulfates,	Sulfatos,
Sulfures,	Sulfuros,
Sulfites,	Sulfitos,
Sulfocyanures,	Sulfocyanuros,
Soufre,	Azufre,
Acide sulfurique,	Acido sulfurico,
Acide sulfureux,	Acido sulfuroso,
Suif,	Sebo,
Acide tannique,	Acido tanico,
Tannine,	Tanino,
Extraits de tannin,	Extractes de tanino.
Gondron,	Brea,
	Alquitran,
Tartre,	Tartaro,
Tartre émétique,	Tartaro emetico,
Acide Tartarique,	Acido tartarico,
Savones pour l' industrie	Jabones para telas,
textile,	
Etain,	Estaño,
Chlorure d' étain.	Cloruro de estaño,
Protochlorure d' etain,	Protocloruro de estaño,
Gomme adragante,	Goma alquitira,

English.	German.
Tungstic acid,	Wolframsäure,
Turmeric,	Curcuma,
Turkey-red oil,	Turkischrothöl,
Ultramarine,	Ultramarin,
Umber,	Umbra,
Uranium,	Uran,
Valonia,	Vanadinsäure,
Vanadium,	Vanadin,
Varnish,	Firniss,
Vat,	Küpe,
Velvet,	Sammt,
Vermillion,	Zinnober,
Vinegar,	Essig,
Violet,	Violett.
Wall paper,	Tapetenpapier,
Washing,	Waschen,
Waste,	Abfall,
Water,	Wasser,
Waterglass,	Wasserglas,
Wax,	Wachs,
Weld,	Waw,
Whale oil,	Walöl,
Wheat starch,	Weizenstärke,
White,	Weiss,
White lead,	Bleiweiss,
Woad,	Waid,
Wood alcohol,	Holzgeist.
Wool,	Woll.
Wool fat,	Wollfett,

French.	Spanish.
Acide tungstique,	Acido tungstico,
Curcuma,	Curcuma,
Huile pour rouge turc,	Aceite para rojo turco,
Outremer,	Ultramarino,
Terre d' ombre,	Sombra,
Uranium,	Uranio,
Acide vanadique,	Acido vanadico,
Vanadium,	Vanadio,
Vernie,	Barniz,
Cuve,	Cuva,
Velour,	Terciopelo,
Vermillon,	Cinabrio,
	Bermellon rojo,
Vinagre,	Vinagre,
Violet,	Violaceo,
Papier tenture,	Papel para tapizar,
Lavage,	Lavadura,
Déchet,	
Eau,	Agua.
Silicate de soude,	Silicato de sosa,
Cire,	Cera,
Ganda,	Gualda.
Huile de baleine,	Aceite de ballena,
Amidon de froment,	Almidon de trigo,
Blanc,	Bianco.
Céruse,	Albayalde,
Guède,	Pastel,
Alcool méthylique,	Alcohol metilico,
Laine,	Lano.
Graisse de laine,	Graso de lano,

English.	German.
Writing-inks,	Schreibtinten,
Yellow,	Gelb,
• Zinc,	Zink,
Zinc white,	Zinkweiss,

French.
Encres à écrire,
Jaune,
Zinc,
Blanc de zinc,

Spanish.
Tintas para escribir,
Amarillo,
Zinc,
Blanco de zinc.



PART III.

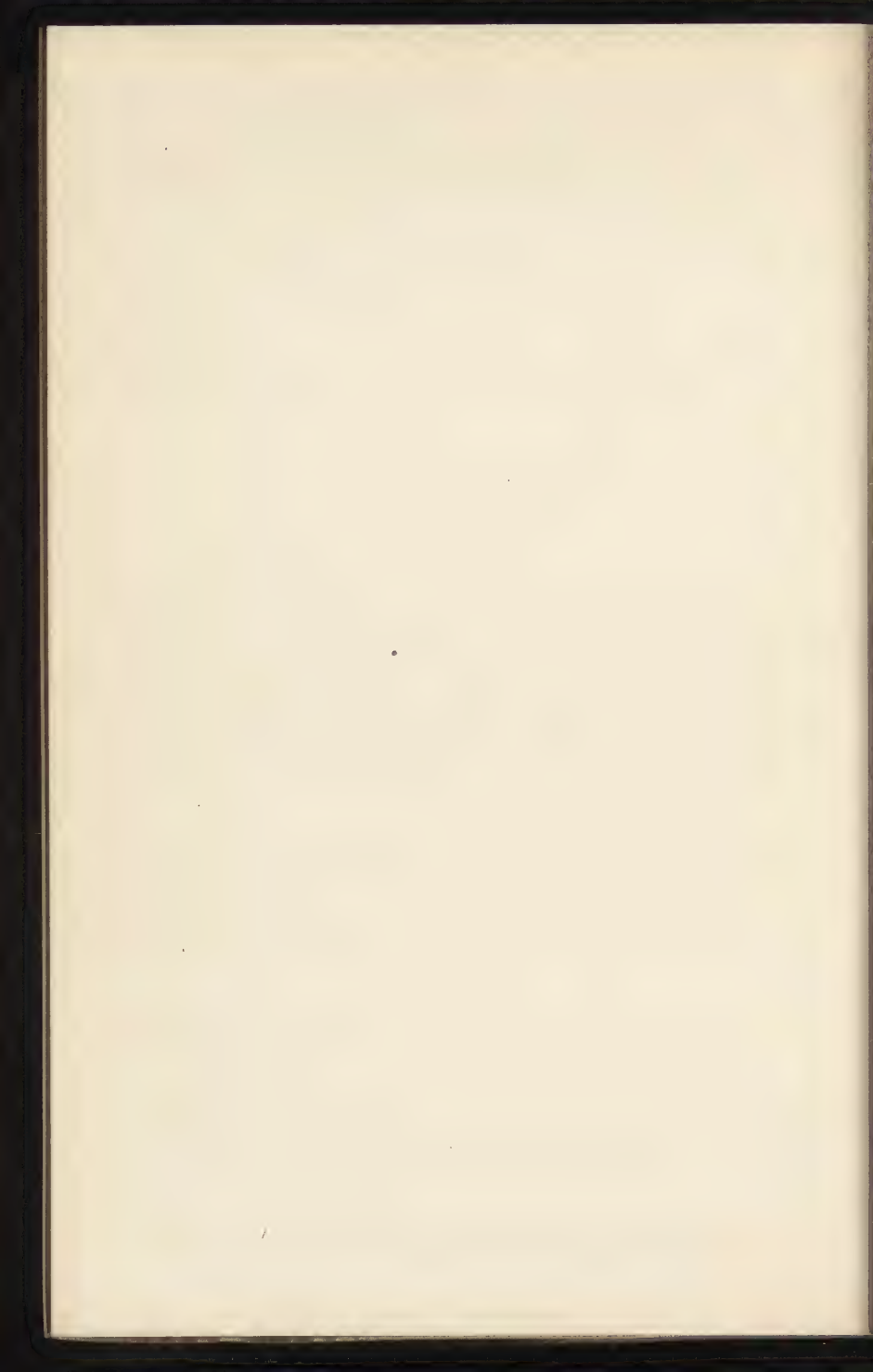


PATENTS.



PATENTS FOR THE YEAR 1901.

- I. Dyestuffs and coloring matters.
- II. Machines applied to dyeing, etc.
- III Processes of dyeing, mordanting, etc.
- IV. Miscellaneous.



DYESTUFFS AND COLORING
MATTERS.



PATENTS.

MONOAZO BLACK DYE AND PROCESS OF MAKING SAME.

Friedrich Krecke, of Biebrich, Germany, assignor to Kalle & Co. No. 664,955, dated January 1, 1901.

This invention relates to the manufacture of a new monoazo dyestuff by combining diazotized picramic acid with 1.6 di-oxynaphthalene-3-sulfonic acid. The new dyestuff is a dark-colored powder showing metallic luster. It is easily soluble in water with reddish-violet color, in concentrated sulfuric acid with violet color, and very difficultly soluble in alcohol. It dyes a deep violet on wool from an acid-bath. By a subsequent treatment with chromium salts (sodium bichromate, chromium fluorid) the original shade is changed into a deep black, which is distinguished by an excellent fastness against the action of alkali, soap, and light.

BLACK SUBSTANTIVE SULFUR DYE AND PROCESS OF MAKING SAME.

Alcide Francois Poirrier, of Paris, France. No. 665,547, dated January 8, 1901.

The inventor has found that new black-substantive dyestuffs of much importance in dyeing cotton are obtainable by

melting with sulfur alone or with sulfur and sodium sulfid certain dyestuffs of the indophenol group or of the indoanilin group. These dyestuffs, which form the raw material for the dyestuffs manufactured as herein set forth, are made in the known manner by oxidizing a mixture of paraphenylenediamin or paramidophenol with phenols or naphthols. These easily-prepared dyestuffs are then treated in the above manner.

By treating the coloring-matter resulting from the oxidation of an equimolecular mixture of para-phenylenediamin and α -naphthol a bluish-black powder, which, when melted in sulfid of sodium is soluble in water, is obtained. The water solution dyes unmordanted cotton at the boiling-point in the presence of a little common salt. The dyes fixed by oxidation with bichromate of potash are black with blue reflection. In a similar manner by treating according to the process herein described the coloring-matter resulting from the oxidation of an equimolecular mixture of paraphenylenediamin and phenol a coloring-matter of a very slightly greenish-black appearance, which is very easily soluble in boiling water, is obtained. The water solution dyes the unmordanted cotton very easily at the boiling-point in the presence of common salt and gives very handsome black colors with purplish reflections after fixation by oxidation with bichromate of potash.

WOOL DYE AND PROCESS OF MAKING SAME.

Karl Schirmacher, of Soden, Germany, assignor to the Farbwerke, Vormals Meister, Lucius & Bruening, of Hoechst-on-the Main, Germany. No. 665,696, dated January 8, 1901.

The claims cover:—

1. The process for the manufacture of a dyestuff, which consists in diazotizing ortho-ortho-diamido-para-phenolsulfonic acid and in combining it with betanaphthol.
2. As a new product the dyestuff obtained by combining the diazotized ortho-ortho-diamido-para-phenolsulfonic acid with betanaphthol, being easily soluble in water to a violet coloration, its solution becoming red on addition of mineral acids and which dyes wool red brown, the shade turning blue black on subsequent treatment with chromates.

SULFURIZED INDOPHENOL DYE AND PROCESS OF
MAKING SAME.

Albert Bertschmann, of Basle, Switzerland, assignor to the Society of Chemical Industry in Basle. No. 665,726, dated January 8, 1901.

The claims cover:—

1. The process for the manufacture of sulfurized dyestuffs, dyeing non-mordanted cotton, by treating paraoxydialphylamin derivatives with alkaline polysulfids, in presence of organic solvents.

2. The process for the manufacture of sulfurized dyestuffs, dyeing non-mordanted cotton, by treating paraoxydialphylamin derivatives with alkaline polysulfids, in presence of organic solvents and treating the dyestuffs thus obtained with weak oxidizing agents.

3. The process for the manufacture of a sulfurized dyestuff, dyeing non-mordanted cotton violet blue to black blue by heating 2,4-dinitro-4-oxy-diphenylamin with tetrasulfid under pressure in presence of alcohol and separating, after cooling, by filtration, the crystalline dyestuff from the mother-liquor.

4. As a new article of manufacture, the dyestuff, which is, in dry state, a crystalline, deep-blue powder with coppery luster, soluble in alkali sulfids with reddish-blue coloration and dyeing non-mordanted cotton in solutions containing alkali sulfids violet-blue to black-blue shades.

ORANGE DYE AND PROCESS OF MAKING SAME.

Karl Jedlicka, of Basle, Switzerland, assignor to the Society of Chemical Industry in Basle. No. 666,095, dated January 15, 1901.

The claims cover:—

1. The process for the manufacture of derivatives of the acridinium series, which process consists in treating alkylamidoacridin dyestuffs with alkylating agents.

2. As new products, the new orange-yellow to orange-red dyestuffs, belonging to the alkylamidoacridinium series, which are obtained by alkylating alkylamidoacridin dyestuffs and which are not precipitated from their aqueous solutions by the addition of sodium carbonate or ammonia.

3. As a new article of manufacture the orange dyestuff, which can be obtained by methylating alkylamidoacridin dyestuffs known in common by the name "patentphosphin," and which appears, in dry state, as a brownish-red to tile-red powder, easily soluble in water, producing an orange-yellow to orange-red solution, which is not changed by the addition of sodium carbonate or ammonia, which is soluble with difficulty in cold alcohol, but more easily soluble in hot alcohol with an orange coloration, which is insoluble in ether and benzene and soluble in concentrated sulfuric acid of 66° Baumé with a yellow coloration and a greenish-yellow fluorescence, and dyes tannin-mordanted cotton in clear orange-yellow to orange-red shades, fast to the action of alkali.

YELLOW ACRIDIN DYE AND PROCESS OF MAKING

SAME.

Karl Jedlicka, of Basle, Switzerland, assignor to the Society of Chemical Industry in Basle. No. 666,096, dated January 15, 1901.

The claims are for:—

1. The process for the manufacture of derivatives of the "acridinium" series by treating amidoacridins with alkylating agents in total absence of acids.

2. As a new product, the new class of yellow dyestuffs of the acridinium series, which can be obtained by alkylating amidoacridins in the acridin nitrogen, and which are not precipitated from their aqueous solutions by the addition of sodium carbonate or ammonia.

3. As a new article of manufacture the yellow dyestuff, obtained by alkylating acridin-yellow, forming an orange to brownish-yellow powder, easily soluble in water to a yellow intensively green fluorescent solution, which is not changed on addition of sodium carbonate or ammonia, but gives a precipitate by addition of caustic soda, difficultly soluble in cold, more easily soluble in hot alcohol, insoluble in ether and benzene, soluble in concentrated sulfuric acid of 66° Baumé with a light-yellow color and greenish-yellow fluorescence and producing on mordanted cotton yellow shades of great fastness to alkalis.

VIOLET ANTHRACENE DYE.

Oscar Bally, of Mannheim, Germany, assignor to the Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 666,594, dated January 22, 1901.

It is known that if mono-amido-anthraquinone sulfo-acids be treated with halogenizing agents they can be converted into halogen derivatives. The inventor has found that upon treating these halogen mono-amido-anthraquinone sulfo-acids with aromatic amines coloring-matters are directly obtained which are soluble in water and which dye chrome mordanted or unmordanted wool, giving violet to blue shades. The process consists in heating a halogenized amido-anthraquinone sulfo-acid, or a salt thereof, with an aromatic amine until no further increase in the quantity of coloring-matter formed takes place. After the melt obtained is cooled it is treated with benzene, ether, alcohol, or a similar solvent, which will dissolve the excess of the amine used, but leaves the coloring-matter undissolved. This residue is collected and constitutes the finished coloring-matter. If desired it can be purified by dissolving and reprecipitating.

ANTHRAQUINONE DYE AND PROCESS OF MAKING
SAME.

Robert E. Schmidt and Andreas Jacobi, of Elberfeld, Germany, assignors to the Farbenfabriken of Elberfeld Company. No. 666,702, dated January 29, 1901.

This invention relates to the production of new dyestuffs by causing primary aromatic amines to act on nitro-oxyanthraquinone-sulfonic acid. This acid can be obtained by sulfonating and then nitrating erythroxyanthraquinone. The new coloring-matters are dark-blue powders more or less easily soluble in water with a blue color. They yield on unmordanted wool blue shades and on chrome-mordanted wool greenish-blue shades. The claim specifically covers the dyestuff obtained by using paratoluidin as the amine.

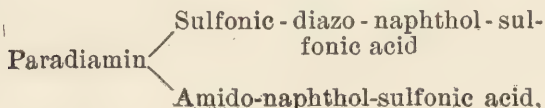
BLUE COTTON DYE AND PROCESS OF MAKING SAME.

Julius Herbabny, of Offenbach-on-the-Main, Germany, assignor to K. Oehler, Anilin and Anilinfarben Fabrik. No. 666,866, dated January 29, 1901.

The claims cover generally:—

1. The manufacture of new blue cotton dyes, consisting in the combination of the intermediate product from a paradiamin and one molecule of a sulfonic-diazo-naphthol-sulfonic acid with one molecule of an amido-naphthol-sulfonic acid.

2. As new articles of manufacture the blue cotton dyes herein described of the general formula:

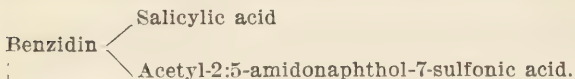


deriving from one molecule of a para-diamin, one molecule of a sulfonic-diazo-naphthol-sulfonic acid, and one molecule of a periamido-naphthol-sulfonic acid, which are in a dry state grayish-black powders, practically insoluble in alcohol, dissolving in water to a pure-blue solution which remains unaltered by the addition of either diluted hydrochloric acid or a little diluted soda-lye while turning reddish violet on adding concentrated soda-lye, yielding in concentrated sulfuric acid a dark bluish-green solution from which separates a blue precipitate on adding much water, and dyeing unmordanted cotton pure-blue shades fast against washing and light. Specifically they include the dyestuff derived from one molecule of dianisidin, one molecule of 2-sulfonic-diazo-8-naphthol-6-sulfonic acid and one molecule of 1:8-amido-naphthol-3:6-disulfonic acid.

CLARET-RED DISAZO DYE AND PROCESS OF MAKING SAME.

Julius Herbabny. of Offenbach-on-the-Main, Germany, assignor to K. Oehler, Anilin and Anilinfarben Fabrik. No. 666,867, dated January 29, 1901.

If acetyl-2:5-amidonaphthol-7-sulfonic acid is made to act upon intermediate products derived from para-diamins and the oxy-carboxylic acids of the benzene series, coloring-matters are obtained dyeing unmordanted cotton in yellowish to bluish claret-red shades of good fastness, being especially distinguished from all other similar dyestuffs by their great fastness to light. In order to form such dyes, there may be employed as diamins benzidin, tolidin, dianisidin, para-phenylenediamin and as oxy-carboxylic acids those of the benzene and their homologues. For example the dyestuff obtained from



forms in its dry state a brownish-violet powder hardly soluble in cold and readily soluble in hot water with a yellowish-red color and dyes unmordanted cotton a yellowish claret-red fast to light and washing.

BLUE SULFUR DYE AND PROCESS OF MAKING SAME.

René Bohn, of Mannheim, Germany, assignor to the Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 667,486, dated February 5, 1901.

This invention relates to the production of new blue coloring-matter from 1.5-dinitro-naphthalene. This new coloring-matter can be obtained by treatment of 1.5-dinitro-naphthalene in the presence of sulfuric acid with hydrogen sulfid. It may also be obtained by passing hydrogen sulfid into a naphthazarin melt prepared in the well-known manner, preferably if it be heated to about one hundred and thirty (130°) degrees centigrade. This new coloring-matter in the dry state is a blue-black powder. In the form of a thirty (30) per cent. paste with water it possesses a blue color and is soluble in hot water, giving a green-blue solution, which solution when made alkaline with sodium carbonate or caustic soda does not change in color. In dilute caustic-soda solution it dissolves, giving a green-blue solution. It dyes unmordanted wool a blue color, which after treatment with potassium bichromate changes to a green.

PROCESS OF MAKING BLACK SUBSTANTIVE SULFUR DYE.

Karl Elbel and Ignaz Rosenberg, of Bielebrich, Germany, assignors to Kalle & Co. No. 667,689, dated February 12, 1901.

This invention relates to a method of manufacturing substantive cotton-dyes by melting certain para-oxydintrodiphenylamin derivatives containing a carboxylic group together with

sulfur and an alkaline sulfid. The coloring-matters obtained in this manner dye blacks on unmordanted cotton from alkaline baths containing sodium sulfid. They produce shades fast to washing and light. Owing to the presence of the carboxylic group the new dyestuffs form lakes when subsequently treated on the fiber with metallic salts. These lakes resist still better the influence of washing and light than the original dyeings. By this subsequent treatment of dyeings also the depth is increased, while the shade of the color is not materially altered. The inventors have further found that it is of no consequence in which of the two benzene nuclei of the diphenylamin the carboxylic group is contained, but that it is essential for the fastness of the product that the carboxylic group takes up the ortho position either to the imido or to the hydroxy group.

VIOLET-BLACK AZO DYE AND PROCESS OF MAKING SAME.

Otto Ernst and Karl Schirmacher, of Hoechst-on-the-Main, Germany, assignors to the Farbwerke, Vormals Meister, Lucius & Bruening. No. 667,935, dated February 12, 1901.

The black azo dyestuffs for wool hitherto and now on the market are all disazo dyestuffs, which, though inferior in their property of dyeing evenly, are generally employed in wool-dyeing on account of their comparative cheapness and some advantages in their properties of fastness. Several methods have become known of late by which black dyes may be obtained on wool with evenly-dyeing monoazo dyestuffs. The monoazo dyestuffs produced for this purpose, however, could not compete with disazo blacks for wool obtained partly from the cheapest material in the coal-tar industry. Now the inventors have found that from diazotized 6-nitro-2-amido-1-phenol-4-sulfonic acid, on the one hand, and beta-naphthol, on the other hand, a monoazo body may be obtained which direct-

ly dyes wool deep violet and which on treatment with chromium compounds may be transferred into a black dye of excellent properties. The tinctorial power is considerable. The fastness to water, acid, alkali, light, rubbing, and sulfur is excellent. The fastness to milling and shrinking is perfect, and the properties of dyeing evenly are very remarkable, for even inferior material of loose wool is dyed evenly.

BLUE WOOL-DYE AND PROCESS OF MAKING SAME.

Arnold Hess, of Hoechst-on-the-Main, Germany, assignor to the Farbwerke, Vorm, Meister, Lucius & Bruning. No. 668,445, dated February 19, 1901.

It is known that in the manufacture of naphthazarin a compound is obtained which is transformed into naphthazarin when heated with acids. The inventor found that if this intermediary product be heated with anilin or its homologues and the anilid thus resulting be sulfonated a blue dyestuff may be obtained. To produce this coloring-matter, it is necessary to employ the said bases in such quantity that at least three of their molecular proportions correspond to one molecular proportion of the intermediary product and to heat the mixture till the color, at first green, turns to blue-violet. The combining of the intermediary product with anilin is best carried out in the presence of anilin hydrochlorid and without dissolvents. If glacial acetic acid be used as solvent, heating for some time is necessary to complete the reaction. The sulfonation may be carried out with monohydrate. The dyestuff when dry is a blue-black powder of metallic luster, readily soluble in water with a blue color. Alkali does not change the color of the solution. It dyes wool blue in an acid-bath, and on subsequent treatment with chromium a very fast gray shade is obtained.

BLUISH TRIPHENYL METHANE DYE AND PROCESS OF
MAKING SAME.

Ivan Levinstein and Richard Herz, of Manchester, England, assignors to Levinstein, limited. No. 668,580, dated February 19, 1901.

The claims cover: 1. The process for the production of triphenylmethane coloring-matters which consists in gradually oxidizing orthotoluene sulfonic acid with an alkali hypochlorite in presence of a caustic alkali thus producing a stilbene sulfonic acid, in neutralizing the alkaline product, in further oxidizing the resulting alkali salt of stilbene sulfonic acid with a permanganate solution, evaporating to dryness, dissolving out the thus-produced aldehyde and condensing it with an aromatic amin component to form a leuco base, and in finally oxidizing the leuco base. 2. The process for the production of a bluish-green triphenylmethane coloring-matter which consists in the oxidation of paranitrotoluene orthosulfonic acid with sodium hypochlorite in presence of caustic soda, in neutralizing the alkaline product, in further oxidizing the resulting sodium salt of dinitrostilbene orthosulfonic acid with a permanganate solution, evaporating to dryness and dissolving out the thus-produced paranitroorthosulfobenzaldehyde, condensing it with an alkylated aromatic amin, and in finally oxidizing the leuco base thus produced. 3. The process in the production of triphenylmethane coloring-matters which results in the formation of an alkali salt of dinitrostilbene disulfonic acid and which consists in gradually oxidizing orthotoluene sulfonic acid with an alkali hypochlorite in presence of a caustic alkali, and in neutralizing the alkaline mixture. 4. The process in the product of triphenylmethane coloring-matters which consists in oxidizing dinitrostilbene disulfonic acid with a solution of potassium permanganate, evaporating to dryness, dissolving out the produced aldehyde, condensing it with an aromatic amin component, and in finally oxidizing the leuco base so produced.

**BLUE DYE OF NAPHTHALENE SERIES AND PROCESS
OF MAKING SAME.**

René Bohn, of Mannheim, Germany, assignor to the Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 669,894, dated March 12, 1901.

In United States Patent No. 631,614, granted August 22, 1899, there is described the production of a leuco compound from the body known in chemical literature as "naphthazarin" intermediate product. In United States Patent No. 627,896, granted June 27, 1899, the conversion of the said leuco compound into new blue coloring-matter having the nature of a sulfo-acid is described. The present invention relates to the manufacture of a blue coloring-matter which is but difficultly soluble in cold water by boiling the said sulfonated coloring-matter of the said Patent No. 627,896 with anilin hydrochlorate or the hydrochlorate of an equivalent aromatic amin in aqueous solution. The new coloring-matter dyes unmordanted wool from the acid-bath, giving blue shades, which possess an excellent degree of fastness to light. It may occur as a brown powder showing a metallic luster. It is but difficultly soluble in cold water, but more soluble in hot water, giving a violet-blue solution, which solution becomes a pure-blue color on addition of dilute caustic-soda solution and on addition of sulfuric acid becomes of a magenta color. The solution in concentrated sulfuric acid is violet, which on warming becomes of a magenta color, and in ethyl alcohol the solution is violet. In aqueous caustic-soda and in anilin blue solutions are obtained.

**BLUE TRIAZOL DYE AND PROCESS OF MAKING
SAME.**

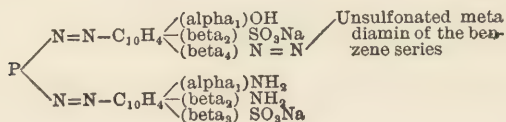
Julius Herbabny. of Offenbach-on-the-Main, Germany, assignor to firm of K. Oehler, Anilin and Anilinfarben-Fabrik. No. 670,398, dated March 19, 1901.

In the German Patent No. 107,498 a process is described for the transformation of the coloring-matter sulfanilic acid-azo-amido-R-salt into a triazol trisulfonic acid which may be converted into a dioxy triazol mono sulfonic acid by melting it during five hours with the triple quantity of sodium lye of sixty per cent. at 230° centigrade. This acid, combined with diazo compounds, yields valuable coloring-matters. By the action of the tetrazo compounds of para-diamins upon the dioxy triazol mono sulfonic acid either so-called "intermediate" products or tetrazo dyestuffs will be obtained, according to the molecular proportions used. The dioxy triazol mono sulfonic acid may also easily be combined with those intermediate products which are formed from the terazo compounds of para-diamins are amins, phenols, amidophenols, their sulfonic or carboxylic acids, thus yielding tetrazo dye-stuffs. A valuable coloring-matter of this series results when the intermediate product obtained in an alkaline solution from one molecule of the tetrazo compound of a paradiamin and one molecule of the 1.8-amidonaphthol-3.6-disulfonic acid is combined with one molecule of the above-mentioned dioxytriazolmonosulfonic acid. It dyes unmordanted cotton blue shades fast to washing.

BLACK TRISAZO DYE AND PROCESS OF MAKING SAME.

Karl Elbel and Ignaz Rosenberg, of Biebrich, Germany, assignors to Kalle & Co. No. 671,543, dated April 9, 1901.

This invention relates to the manufacture of valuable black trisazo dyestuffs having the general formula—



in which formula P stands for para phenylene diamin and paradiamido diphenylamin. The new process consists in preparing the tetrazo compound of the intermediate product obtained by combining one molecule of para diamin with one molecule of gamma amidonaphthol sulfonic acid in alkaline solution and combining the said tetrazo compound first with one molecule of an unsulfonated meta diamin of the benzene series and afterward with one molecule of alpha, beta, naphthylene diamin beta, sulfonic acid. The dyestuff derived from paradiamido diphenylamin dyes fast-black shades on unmordanted cotton from an alkaline-salt bath.

AZO DYE.

Akin Tkatsch, of Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 671, 904, dated April 9, 1901.

In the German Patent No. 70,788 an amidophenol sulfo-acid known as "amido-phenol sulfo-acid IV" is described. The inventor has discovered that if this be treated with monochloracetic acid in the presence of sodium acetate a new hydroxy-phenyl-glycocol sulfo-acid is obtained which is called "hydroxy-phenyl-glycocol sulfo-acid IV." This constitutes a new compound for the manufacture of azo dyes by combination with diazo compounds and the like. In particular it is found that the azo dye obtained from this new component and diazotized ortho-nitro-ortho-amido-phenol-para sulfo-acid is of value. It dyes wool brown from the acid bath. If the dyed goods be then treated with a chromate, the shade turns to a bordeaux color and possesses a high degree of fastness against the action of milling and does not bleed onto white wool, cotton, or silk during this operation. The fastness against washing and the action of light is also very good.

BROWN AZO DYE.

Akim Tkatsch, of Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 671,902, dated April 9, 1901.

In the German Patent No. 74,111 an amido-sulfo-acid known as "amidosulfo-acid III" is described. The inventor has discovered that if this be treated with monochlor acetic acid in the presence of sodium acetate a new hydroxy-phenyl-glycocol sulfo-acid is obtained, which he names this "hydroxy-phenyl-glycocol sulfo-acid III." This constitutes a new component for the manufacture of azo dyes by combination with diazo compounds and the like. In particular it is found that the azo dye obtained from this new component and diazotized ortho-nitro-ortho-amido-phenol-para sulfo-acid is of value. It dyes wool chocolate-brown from the acid-bath. If the dyed goods be then treated with a chromate, the shade becomes lighter and redder and possesses a high degree of fastness against the action of milling and does not bleed into white wool, cotton, or silk during the operation.

BROWN AZO DYE.

Akim Tkatsch, Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 671,903, dated April 9, 1902.

The claim is for: The new azo coloring-matter which can be obtained by the combination of diazotized ortho-nitro-ortho-amid-phenol-para-sulfo-acid and hydroxy-phenyl-glycocol sulfo-acid III which dyes wool chocolate-brown from the acid-bath which shade becomes lighter and redder upon treatment with a cromate and which is soluble in water giving a blue-red solution which turns wine-red upon the addition of an excess of carbonate of soda and which gives an orange-yellow with concentrated sulfuric acid.

BROWN AZO DYE.

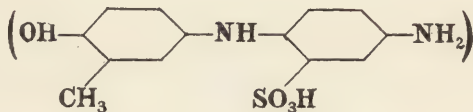
Akim Tkatsch, Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 671,903, dated April 9, 1901.

The claim is for: The new azo coloring-matter which can be obtained by the combination of diazotized picramic acid and hydroxy-phenyl-glycol sulfo-acid IV which dyes wool from the acid-bath a red-brown which shade turns a dark-brown color upon treatment with potassium bichromate and which gives a yellow-red solution in water turning yellow upon the addition of an excess of carbonate of soda and which gives a wine-red color with sulfuric acid.

BLACK SULFUR DYE.

Hermann Gussmann, of Hoechst-on-the-Main, Germany, assignor to the Farbwerke. Vorm, Meister, Lucius & Bruening. No. 671,908, dated April 9, 1901.

The inventor has found that by heating the condensation product of paranitrochlorbenzenesulfonic acid and para-amidocresol



with sulfur and a sulfid of an alkali metal a valuable black dyestuff may be obtained.

Manufacture of the Dyestuff.—One part, by weight, of para-oxy-meta-methyl-para-amido - diphenylamin - ortho sulfonic acid is introduced into a molten mixture of one part, by weight, of sulfur and three parts, by weight, of sodium sulfid, and the whole is heated for one to two hours to 180° centigrade and afterward for three to four hours to 240° centigrade. An active evolution of hydrogen sulfid takes place. The product is a dark porous mass. Its aqueous solutions may be directly employed for dyeing. They dye unmordanted cotton in deep black tints.

WOOL-DYE AND PROCESS OF MAKING SAME.

Karl Schirmacher, of Hoechst-on-the-Main, Germany, assignor to the Farbwerke, Vorm, Meister, Lucius & Bruening. No. 672.714, dated April 23, 1901.

The inventor has found that chloroamidophenolsulfonic acid obtained by sulfonating and nitrating para-dichlorobenzene, treating with alkali, and subsequently reducing may be employed for the manufacture of valuable dyestuffs by diazotizing said acid and combining it with amidonaphtholsulfonic acid G. In a dry state the new dyestuff is a gray-black powder soluble in water with a blue-red color. The dyestuff dyes wool red-brown in an acid-bath. On subsequent treatment with bichromate a blue-gray of remarkable fastness to milling and light is obtained.

DISAZO DYE AND PROCESS OF MAKING SAME.

Felix Herwig, of Elberfeld, Germany, assignor to the Farbenfabriken of Elberfeld Company of New York, N. Y. No. 673,079, dated April 30, 1901.

The process for producing the new disazo dyestuffs consists in first combining a diazo derivative of an aromatic amin with beta₁-amido-alpha₂-naphthol-beta₃-sulfonic acid in an alkaline solution; secondly, diazotizing the resulting amidoazo compound, and, finally, coupling the diazoazo compound thus obtained with an amidonaphtholsulfonic acid, or in first diazotizing the beta₁-amido-alpha₂-naphthol-beta₃-sulfonic acid; secondly, coupling the resulting diazo compound with an amidonaphtholsulfonic acid, and, finally, combining the resulting monoazo dyestuff in an alkaline solution with a diazotized aromatic amin. The new dyestuffs producible in the above-defined manner are dark powders soluble in water with from violet to bluish-black color. They dye unmordanted cotton from bluish-red to bluish-black shades, which are distinguished by a remarkable fastness to light. The patent specifically covers the dyestuff obtained by combining

a diazo derivative of anilin with one molecule of beta₁-amido-alpha₃-naphthol-beta₄-sulfonic acid, secondly rediazotizing the resulting amidoazo compound and finally coupling the diazoazo compound thus produced with a second molecule of beta₁-amido-alpha₃-naphthol-beta₄-sulfonic acid.

BLUE COTTON DYE AND PROCESS OF MAKING SAME.

Robert Demuth, of Elberfeld, Germany, assignor to the Farben-Fabriken of Elberfeld Co., of New York, N. Y. No. 673,388, dated May 7, 1901.

In the specification forming part of the U. S. Patent, No. 614,538, is described the production of blue cotton dye, which process consists in subjecting 1.8-amidonaphtholsulfo-acids to the action of alkaline-sulfid-carrying compounds at elevated temperatures and subsequently treating the resulting melts in a suitable manner in order to isolate therefrom the blue dye, which isolation can be effected by repeatedly treating the melts with small quantities of hot water, filtering off the solutions thus formed, continuing this extraction until the blue dye contained in the melts has been wholly dissolved out, and finally precipitating from the resulting filtrates the blue dye by the addition of a suitable salt. The inventor has now found that new technically-valuable cotton dyes likewise yielding blue shades can be obtained in a much cheaper way by mixing 1.8-amidonaphtholsulfo-acids or alkaline salts thereof with alkaline sulfid and zinc (using either metallic zinc, such as zinc dust, or any zinc compound) and subsequently heating the so-formed mixtures at elevated temperatures. The products thus obtained can be directly employed for dyeing purposes, so that a further purification or isolation thereof is unnecessary. They produce on unmordanted cotton blue shades when they are dyed in baths containing sodium chlorid or sodium chlorid and sodium carbonate or the like. The shades withstand the action of alkalies and are sufficiently fast to the action of light.

GREEN-BLUE DYE AND PROCESS OF MAKING SAME.

Fritz Bender and Bertram Mayer, of Muhlheim-on-the-Main, Germany, assignors to Farbwerke Muhlheim, Vorm. A. Leonhardt & Co. No. 673,632, dated May 7, 1901.

This invention relates to a new greenish-blue coloring-matter which may be obtained by condensing tetramethyldiamidobenzhydrol with paratoluenesulfonic acid, sulfonating the thus-obtained leucomonosulfonic acid, and oxidizing the thus-formed leucodisulfonic acid. The dyestuff forms when dried a dark powder of a copper-like luster. It dissolves in water with a beautiful blue color. The solution when mixed with soda-lye becomes slowly decolorized in the cold, more rapidly in the heat. Acetic acid restores the color. The coloring-matter dissolves in a small quantity of sulfuric acid with a yellow color, which by the addition of water turns from green to blue. Similar coloring-matters are obtained by employing instead of tetramethyldiamidobenzhydrol other alkylated diamidobenzhydrols. Thus, for instance, by employing tetraethyldiamidobenzhydrol a blue coloring-matter of a more greenish-tint is obtained.

BLUE WOOL DYE AND PROCESS OF MAKING SAME.

Arnold Hess, of Hoechst-on-the-Main, Germany, assignor to Farbwerke, Vorm. Meister, Lucius & Bruening. No. 673,640, dated May 7, 1901.

The claims are for: The process for the manufacture of a blue dyestuff for wool, which consists in introducing hydrogen sulfid into the solution of 1.5-dinitronaphthalene in chlorosulfonic acid, substantially as set forth. As a new product, the blue dyestuff obtained by introducing hydrogen sulfid into a solution of 1.5-dinitronaphthalene in chlorosulfonic acid at temperatures of about 140° centigrade, being a black-blue powder of metallic luster, readily soluble in hot water and in sodium carbonate with a blue-violet color, in soda-lye with a blue and in concentrated sulfuric acid with

a brown color, insoluble in nitrobenzene and dyeing wool blue in an acid-bath, yielding very fast gray shades on subsequent treatment with chromates.

ANTHRAQUINONE DYE.

Oscar Bally, of Mannheim, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 673,691, dated May 7, 1901.

The claims specify: 1. The new coloring-matter obtained from a halogen derivative of diamido-anthraquinone and an aromatic amin which in the unsulfonated form is soluble in anilin and nitrobenzene the solution being blue to green, and which with cold concentrated sulfuric acid gives a brownish to green color which on heating to one hundred (100°) degrees centigrade becomes violet to blue, this color on addition of boric acid changing from blue to green, and which in the sulfonated form is soluble in water and dyes unmordanted wool or wool mordanted with chrome blue to green shades. 2. The new coloring-matter which can be derived from crude diamido-anthraquinone bromid and paratoluidin, which in the unsulfonated form is soluble in anilin and nitrobenzene the solution being green-blue and which with cold concentrated sulfuric acid gives a violet-brown solution, which on heating to one hundred (100°) degrees centigrade becomes reddish violet, this color on addition of boric acid changing to blue, and which in the sulfonated form is soluble in water and dyes unmordanted wool or wool mordanted with chrome blue-green shades.

BROWN DYE AND PROCESS OF MAKING SAME.

Gustav Link, of Hoechst-on-the-Main, Germany, assignor to Farbwerke, Vorm. Meister, Lucius & Bruening. No. 674,137, dated May 14, 1901.

By the action of different reducing agents on 1:8 dinitronaphthalene dyestuffs for directly dyeing cotton may be obtained of which only blue-violet to black tints have hitherto been described. The inventor has now found that under certain conditions—for instance, heating with sodium sulfid

to a high temperature—a brown dyestuff for cotton may likewise be obtained, characterized by the great fastness of its dyes. 1:8 dinitronaphthalene is dissolved in a solution of sodium sulfid $\text{Na}_2 \text{S}$, H_2O and the whole evaporated to dryness. The residue is then spread on tin plates and heated in a drying-stove at 160° to 180° centigrade for from five to six hours until it becomes quite hard. A dark-brown mass is thus obtained which when pulverized may directly be employed for dyeing purposes. It is easily soluble in water to a deep-brown solution. When this solution is acidified, the dyestuff separates as an amorphous dark-brown precipitate, insoluble in pure water, readily soluble in caustic alkalies, sodium carbonate, ammonia, and sulfids of alkali metals.

RHODAMIN SULFONIC ACID AND PROCESS OF MAKING SAME.

Carl Hoffmann, of Hoechst-on-the-Main, Germany, assignor to Farbwerke, Vorm. Meister, Lucius & Bruening. No. 675,216, dated May 28, 1901.

The inventor has found that by sulfonating asymmetric dialkylrhodamins obtained by condensing equivalent quantities of dialkylamido-oxybenzoylbenzoic acid (from one molecular proportion of phthalic acid plus one molecular proportion of dialkyl - m - amidophenol) and m - amidopnenols new technically-valuable dyestuffs are produced which dye wool shades similar to those produced by tetra-alkylrhodamin, but are distinguished from these rhodamins incapable of being sulfonated by their superior dyeing power, so that they yield shades of any desired depth. The sulfonation of these rhodamins is best carried out by means of fuming sulfuric acid containing twenty to thirty-five per cent. of anhydrid; but the temperature must not be too high. By this method he has transformed the asymmetric dialkylrhodamin from dialkylamidoöxybenzoylbenzoic acid and m-amidophenol, as well as the methylated asymmetric dialkylrhodamin, from the said acid and ortho-amido-paracresol (German Patent No. 109,883) into new sulfonic-acid dyestuffs. The new dyestuffs

are substances of metallic luster soluble in water, but with difficulty. They are more easily dissolved, especially when heated, in alcohol and acetone with a red coloration. They are dissolved in concentrated sulfuric acid to a yellow-brown solution with a yellow-green fluorescence. They dye wool in red shades.

YELLOW ACRIDIN DYES AND PROCESS OF MAKING SAME.

Oscar Nastvogel, of Elberfeld, Germany, assignor to the Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 675,568, dated June 4, 1901.

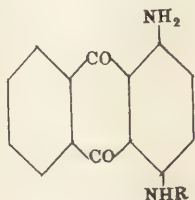
For the preparation of these new coloring-matters certain unsymmetrically dialkylated or trialkylated derivatives of tetra-amidodiphenylmethane or its homologues are employed as bases or starting materials. The bases can be obtained by nitrating the unsymmetrically dialkylated or trialkylated dialphylmethanes and reducing the corresponding dinitro compounds. The said unsymmetrically-alkylated tetra-amidodialphylmethane bases are in a pure state colorless well-crystallizing compounds, but slightly soluble in water. The salts of the said unsymmetrically-alkylated tetra-amidodialphylmethane bases are transformed into acridin derivatives on boiling the same with water either in open vessels or in autoclaves under pressure. In order to accelerate and to complete the reaction, it is advantageous to add to the reaction mixture such agents as are capable of splitting off ammonia—as, for instance, mineral acids, zinc chlorid, or the like. The oxidation of the resulting acridin leuco bases to form the corresponding coloring-matters begins as soon as they are exposed to the action of the oxygen contained in the air; but in order to effect the same more rapidly it is advantageous to employ one of the usual oxidizing agents, such as ferric chlorid or the like. The new dyestuffs thus obtained are when dry and pulverized from red to brown powders, being soluble in water and in alcohol with

an orange-yellow color. The solution of these dyestuffs in alcohol and in water shows a beautiful yellowish-green fluorescence. They dye leather yellow even shades, which turn somewhat redder by the action of mineral acids.

BLUE ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

Robert E. Schmidt, of Elberfeld, Germany, assignor to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 675,572, dated June 4, 1901.

This invention relates to the manufacture of new blue dyestuff sulfonic acids of the anthracene series by causing sulfonating agents to act on anthraquinone derivatives having the following general formula:



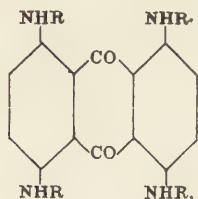
(R meaning in this formula an aliphyl radical, such as phenyl, tolyl, xylyl, or the like.) The said anthraquinone derivatives can be obtained, for instance, by heating α_1 - α_2 -amido-oxyanthraquinone with primary aromatic amines—such as anilin, paratoluidin, xylidin, or the like—in the presence of condensing agents, such as boric acid or the like. In this process the hydroxy group is replaced by an alphyldiamido radical and the condensation products of the above-given general formula are produced. The said bodies can also be

obtained by treating, for instance, alpha₁-alpha₂-nitroamido-anthraquinone with the above-mentioned aromatic amines. By this operation the nitro group is replaced by an alphyamido radical. The new dyestuff sulfonic acids thus obtained are, in a dry state, dark powders which are soluble in water and in ammonia with a blue color. They dye unmordanted and chrome-mordanted wool fast blue shades.

ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

Robert E. Schmidt and Andreas Jakobi, of Elberfeld, Germany, assignors to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 675,573, dated June 4, 1901.

This invention relates to the manufacture of new dyestuff sulfonic acids of the anthracene series by causing sulfonating agents to act on tetra-alkylamidoanthraquinone derivatives having the following general formula:



(R meaning in this formula an alkyl radical, such as phenyl, tolyl, xylol, or the like.) The new dyestuff sulfonic acids obtainable by our new process are, in a dry state, dark powders, which are soluble in water and in ammonia, with from yellowish-green to greenish-blue color. They dye unmordanted and chrome-mordanted wool from yellowish-

green to bluish-green shades. The claim specifies: The new anthraquinone dyestuff obtainable by sulfonating 1.4.5.8-tetraparatoluidioanthraquinone, which dyestuff is, in the shape of its sodium salt, when dry and pulverized, a dark powder readily soluble in water and in ammonia with a green color, being soluble with difficulty in hot alcohol with a greenish-blue color, being dissolved by concentrated sulfuric acid (of 66° Baumé) yielding a greenish-blue solution the color of which is not changed on the addition of a small quantity of ice, while on adding a larger quantity of ice the dyestuff sulfonic acid separates in the shape of green flakes; dyeing unmordanted and chrome-mordanted wool green shades.

ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

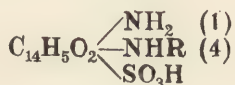
Robert E. Schmidt and Paul Tust, of Elberfeld, Germany, assignors to the Farbenfabriken. of Elberfeld Company, of New York, N. Y. No. 675,574, dated June 4, 1901.

The new process consists in causing halogens, such as bromin, to act on alpha or beta alphyldiamidoanthraquinone sulfonic acids which can be obtained by the action of alphyldamins—such as anilin, toluidin, or the like—on alpha or beta nitroanthraquinone sulfonic acids and further heating the new halogen sulfonic acids thus obtained with primary aromatic amins, such as anilin, ortho or para toluidin, xylidin, or the like. By means of this process valuable blue dyestuff sulfonic acids are obtained. The new coloring-matters thus produced are, in a dry state, dark powders which are soluble with great difficulty in water and soluble in ammonia with a blue color. They dye unmordanted and mordanted wool fast-blue shades. The claim covers specifically the new anthraquinone dyestuff obtained by heating brominated alphasparatolyldiamidoanthraquinone sulphonic acid with paratoluidine. It dyes unmordanted wool clear greenish blue, and chrome mordanted wool blue shades.

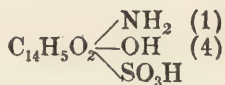
ANTHRAQUINONE DYE AND PROCESS OF MAKING
SAME.

Robert E. Schmidt and Paul Tust, of Elberfeld, Germany, assignors to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 675,575, dated June 4, 1901.

This invention relates to the manufacture of new dyestuff sulfonic acids of the anthracene series from the two 1.4 amidoöxyanthraquinone sulfonic acids, which can be obtained by treating the so-called alpha and beta nitroanthraquinone sulfonic acids with sulfursesquioxid, (S_2O_3 .) Our new process consists in treating the said sulfonic acids of 1.4 amidoöxyanthraquinone having the formula:



with primary aromatic amins—such as anilin, paratoluidin, xylidin, or the like—in the presence of condensing agents, such as boric acid or the like. In this process the hydroxy group is replaced by an alphylamido radical. with the production of new dyestuff sulfonic acids having the following general formula:



(R meaning in this formula an alphyl radical, such as phenyl, tolyl, xyl, or the like). The new dyestuff sulfonic acids thus obtained are in a dry state dark powders which are soluble in water and in ammonia with a blue color. They

dye unmordanted and chrome-mordanted wool fast blue shades. The claim specifies: The new dyestuff sulfonic acid, obtainable from the alpha-sulfonic acid of 1.4 amidoöxyanthraquinone and paratoludin. It dyes unmordanted and chrome-mordanted wool blue shades fast to light and to alkalies.

AZO DYES.

Adolf Israel and Richard Kothe, of Elberfeld, Germany, assignors to Farbenfabriken, of Elberfeld Company. of New York, N. Y. No. 675,629, dated June 4, 1901.

This invention relates to the production of valuable new azo coloring-matters by causing two molecules of the same or two different suitable diazo compounds to act on the urea or thio-urea compounds described in Patents Nos. 675,630 and 675,627. The term "diazo compound" denotes a simple diazo compound as well as a diazotized amidoazo compound, such as diazoazobene, diazoazotoluene, or the like. The new dye-stuffs prepared in the above defined manner are reddish-brown to dark-brown powders having a metallic luster soluble in water with from orange to bluish-red color, being scarcely soluble in concentrated hydrochloric acid. They dye unmordanted cotton from orange to red shades which are of a remarkable fastness to light.

AZO DYE.

Adolf Israel and Richard Kothe, of Elberfeld, Germany, assignors to Farbenfabriken, of Elberfeld Company. of New York, N. Y. No. 675, 632, dated June 4, 1901.

This patent describes specifically the member of the group described in No. 675,629, which is obtained by the use of diazotized paratoluidine. The new coloring-matter dyes unmordanted cotton red shades, which are fast to acids and to light. The process proceeds in an analogous manner if in-

stead of two molecules of diazotized paratoluidin other diazotized compounds are employed. If two different diazo compounds are employed, the first component is combined with the urea derivative in a slightly-acid and the second in an alkaline solution. On using, for instance, two molecules of diazotized beta-naphthylamin a bluish red dyestuff is obtained. On using one molecule of diazotized anilin and one molecule of diazotized acetyl-para-phenylene-diamin also a bluish-red dyestuff is produced.

BLACK DISAZO DYE.

Hugo Geldermann, of Berlin, Germany, assignor to Actien Gesellschaft fuer Anilin Fabrikation. No. 676,494, dated June 18, 1901.

This invention relates to the production of a new disazo dye directly dyeing cotton which contains as end component beta-amido-alpha₁-naphthol-beta₃-sulfonic acid, as middle component alpha₁-naphthylamin-beta₃-sulfonic acid, (Cleve's acid,) and as first component the alkyl ether of para-diamido-para-cresol. In the preceding combination for the alpha₁-naphthylamin-beta₃-sulfonic acid may be substituted the alpha₁-naphthylamin-beta₄-sulfonic acid or a mixture of both these acids without essentially changing the result. The new disazo dye produces an unmordanted cotton from a bath containing soap or common salt bluish-black shades, which by a subsequent diazotation on the fiber and development with metatoluylenediamin are converted into a fine black of remarkable fastness.

BLUE DISAZO DYE.

Hugo Geldermann, of Berlin, Germany, assignor to Actien Gessellschaft fuer Anilin Fabrikation. No. 676,495, dated June 18, 1901.

This invention relates to the production of a new disazo dye directly dyeing cotton which contains as end component

beta₁-naphthol-beta₃-sulfonic acid, as middle component alpha₁-naphthylamin-beta₃-sulfonic acid, (Cleve's acid,) and as first component the alkyl ether of para-diamido-para-cresol. In the preceding combination for the alpha₁-naphthylamin-beta₄-sulfonic acid or a mixture of both these acids without essentially changing the result. The dye produces on unmordanted cotton from a bath containing soap or common salt grayish-violet shades, which by a subsequent diazotation on the fiber and development with beta-naphthol are transformed into a fine indigo blue distinguished by its remarkable fastness.

BLUE TRIPHENYLMETHANE DYES AND PROCESS OF MAKING SAME.

Arthur Hausdoerfer, of Elberfeld, Germany, assignor to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 676,555, dated June 18, 1901.

The inventor has found that valuable new dyestuffs capable of dyeing wool from acid-baths pure blue shades are obtained by condensing symmetrical dibenzyl-meta-xylydin disulfonic acid with tetraalkyl-diamidobenzhydrols, such as tetramethyl-or tetraethyl-para-diamidobenz-hydrol or the like, and then oxidizing the resulting leuco compounds in a suitable manner. These coloring matters contain the two methylic groups in ortho position to the methane carbon and represent when dry and pulverized dark powders having a metallic luster, which are soluble in water with a blue color. They dye wool from acid-baths clear blue shades, which are distinguished by great fastness to alkalies.

DISAZO DYE.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 677,227, dated June 25, 1901.

If the para sulfo-acid of the ortho-nitro-ortho-amido-phenol (see No. 644,234, dated 27th of February, 1900)—be reduced, the corresponding diamido-phenol sulfo-acid is obtained. Upon diazotizing this diamido-phenol sulfo-acid a tetrazo compound results, and the inventor has discovered that this tetrazo compound upon combination first with one of the components hereinafter set forth and then with a second of such components new mixed or unsymmetrical disazo coloring-matters are obtained possessing excellent qualities. The said components are beta-naphthol, 2.6 beta-naphthol-mono-sulfo-acid, 2.3.6 beta-naphthol-disulfo-acid, 1.8.4. amido-naphthol-sulfo-acid, and the like. The coloring-matters so obtained dye wool from the acid-bath, giving shades which vary from bluish violet to greenish blue, and upon treating the dyed goods with potassium bichromate violet shades become bluer and greenish shades become greener, while all become more intense and assume a great fastness against the action of milling, washing, and light. Further, the shades so obtained do not suffer when the goods are steamed or carbonized. The claims cover: 1. As a new article of manufacture the mixed disazo coloring-matters which can be obtained from diamido-phenol-sulfo-acid and herein-described aromatic dye components which are soluble in water, dye wool from the acid-bath giving violet to bluish shades which change in color and become faster upon boiling with a solution of potassium bichromate and which upon suitable reduction yield diamido-phenol-sulfo-acid, and the amido derivatives of the two other components used in its manufacture. 2. As a new article of manufacture the new mixed disazo coloring-matter which can be obtained from diamido-phenol-sulfo-acid, 2.3.6 naphthol-disulfo-acid and beta-naphthol, which is soluble in water giving a blue solution which is not essentially changed in color by the addition of a little carbonate-of-soda solution but turns violet upon the addition of a little caustic-soda solution and red upon the addition of hydrochloric acid and which gives a violet solution in concentrated sulfuric acid and upon suitable reduction yields diamido-phenol-sulfo-acid, amido-naphthol-disulfo-acid, and amido-naphthol.

DISAZO DYE.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 677, 228, dated June 25, 1901.

The claim is specifically for one of the group described in No. 677,227. It covers:—

The new disazo coloring-matter which can be obtained from diamido-phenol-sulfo-acid, 2.6 naphthol sulfo-acid, and beta-naphthol, which is soluble in water giving a green-blue solution which turns bluer upon the addition of sodium-carbonate solution, violet upon the addition of caustic-soda solution, and red upon the addition of hydrochloric acid and gives a red solution in concentrated sulfuric acid, and which upon suitable reduction yields diamido-phenol-sulfo-acid, amido-naphthol-sulfo-acid, and amido-naphthol, substantially as described.

DISAZO DYE.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 677,229, dated June 25, 1901.

This is a member of the group described in Patent No. 677,227. The claim specifies:—

The new disazo coloring-matter which can be obtained from diamido-phenol-sulfo-acid, beta-naphthol and 2.7 dihydroxy-naphthalene which is soluble in water giving a blue solution which is hardly changed upon the addition of sodium-carbonate solution and becomes redder upon the addition of caustic-soda solution and in which a red precipitate is formed upon the addition of hydrochloric acid and gives a violet solution in concentrated sulfuric acid, and which upon suitable reduction yields diamido-phenol-sulfo-acid, amido-dihydroxy-naphthalene, and amido-naphthol.

DISAZO DYE.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 677,230, dated June 25, 1901.

The claim specifies one of the coloring-matters described under Patent No. 677,227, the one that can be obtained from diamido-phenol-sulfo-acid, beta-naphthol and beta-hydroxy-naphthoic-acid which is soluble in water, giving a blue solution, which when very dilute is violet-red, in which blue solution a dark-blue precipitate is formed by the addition of caustic soda, and a red precipitate by the addition of hydrochloric acid and which dissolves in concentrated sulfuric acid the solution being violet, and which upon suitable reduction yields diamido-phenol-sulfo-acid, amido-beta-hydroxy-naphthoic acid, and amido-naphthol.

DISAZO DYE.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 677,231, dated June 25, 1901.

In the specification of U. S. Patent No. 665,696, dated January 8, 1901, the production of a dye has been described from one molecular proportion of the tetrazo compound obtained upon diazotizing ortho-ortho-diamido-phenol-para-sulfo-acid and one molecular proportion of beta-naphthol. The combination is effected in the presence of caustic soda. The inventor has discovered that if the same tetrazo compound be treated with two molecular proportions of beta-naphthol sodium, preferably in carbonate-of-soda solution, a new blue coloring-matter is obtained; but the combination of the tetrazo compound with the two molecular proportions of beta-naphthol takes place exceedingly slowly at ordinary temperature, and even at a temperature of forty (40°) degrees centigrade the reaction cannot be considered complete before the lapse of hours. This new coloring-matter dyes wool from the acid-bath brownish-violet shades, which turn deep-blue black upon treatment with potassium bichromate.

HALOGEN INDIGO SULFO-ACID.

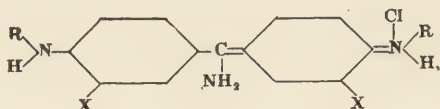
Rudolf Knietsch and Robert Holdmann, of Ludwigshafen, Germany, assignors to the Badische Anilin and Soda Fabrik. No. 677,240, dated June 25, 1901.

The new coloring-matter can be conveniently obtained by starting from para-chlor-ortho-nitro-toluene. This body is oxidized by means of manganese peroxid in sulfuric acid, preferably at a high temperature, so as to obtain para-chlor-ortho-nitro-benzaldehyde. This ortho-nitro-benzaldehyde derivative is then converted by treatment with acetone and caustic soda into a new insoluble indigo coloring-matter. This can be done either directly or the intermediate para-chlor - ortho - nitro - phenol - lactic - acid - methyl - ketone formed can be isolated and either used as such or after conversion into its bisulfite compound for conversion into indigo by treatment with alkali. After drying the product thus obtained it is treated with such a quantity of fuming sulfuric acid as contains sufficient free sulfuric anhydrid (SO_3) to effect a complete sulfonation of the indigo. This product dyes blue shades on wool in an acid-bath.

BASIC DYES AND PROCESS OF MAKING SAME.

Friedrich Runkel, of Elberfeld, Germany, assignor to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 677,279, dated June 25, 1901.

This invention relates to the production of new reddish-violet dyestuffs by condensing in the presence of mineral acids the auramins, having, for instance, the following general formula:

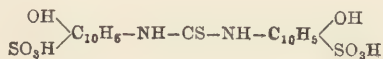


(in which formula R means an alkyl radical—such as methyl, ethyl, or the like—X, a hydrogen atom, which can be substituted by a methylic group) with alpha-methylindole. The new dyestuffs are, in the shape of the mineral-acid salts, dark-brown powders, which are readily soluble in water with a reddish-violet color, which is not essentially changed by the addition of dilute mineral acids. They are also readily soluble in alcohol with a reddish-violet color and are dissolved by concentrated sulfuric acid of 66° Baumé with a yellowish-brown color. They dye cotton mordanted with tannin, wool, and silk reddish-violet shades fast to the action of dilute mineral acids.

RED AZO DYE AND PROCESS OF MAKING SAME.

Adolf Israel and Richard Kothe, of Elberfeld, Germany, assignors to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 677, 516, dated July 2, 1902.

This invention relates to the production of valuable new azo coloring-matters by causing three molecules of either the same or different diazo compounds to act on the guanidin derivatives produced by treating the thio-urea compounds of amidonaphthol sulfonic acids having the formula:



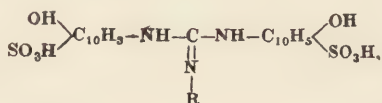
with amidonaphthols or amidonaphthol sulfonic acids (such as beta₁-amido-alpha₃-naphthol, beta₁-amido-beta₄-naphthol, beta₁ - amido - alpha₃ - naphthol - beta₄ - sulfonic acid, alpha₁-amido - alpha₃ - naphthol - beta₄ - sulfonic acid, beta₁-amido-alpha₄-naphthol-beta₃-sulfonic acid, or the like) in the presence of agents capable of absorbing sulfureted hydrogen. These are from reddish-brown to dark-brown powders soluble in water with from orange to bluish-red color. They dye unmordanted cotton from orange to bluish-red shades.

The claims specify the dyestuff obtained by the use of diazotized para xylidin as the diazo compound.

RED AZO DYE AND PROCESS OF MAKING SAME.

Adolf Israel and Richard Kothe, of Elberfeld, Germany. assignors to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 677,517, dated July 2, 1901.

This invention relates to the production of valuable new azo coloring-matters by causing two molecules of either the same or two different diazo compounds to act on the guanidin derivatives of amidonaphthol sulfonic acids having the following general formula:



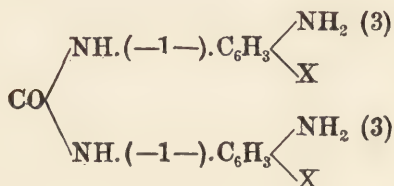
in which formula R means a hydrogen atom which can be replaced by a fatty or an aromatic radical, such as methyl, phenyl, oxynaphthyl, oxynaphthyl-sulfonic acid, or the like. They are from reddish-brown to dark-brown powders having a metallic luster, dissolving in water with from orange to bluish-red color. They dye unmordanted cotton from orange to bluish-red shades which are of a remarkable fastness to acids and to light.

The claims specify the dyestuff obtained by combining two molecules of diazotized para-xylidin with one molecule of the dioxynaphthyl-guanidin disulfonic acid.

ORANGE DISAZO DYE AND PROCESS OF MAKING SAME.

Moritz Ulrich and Karl Heidenreich, of Elberfeld, Germany, assignors to Farbenfabriken of Elberfeld Co. of New York, N. Y. No. 678,323, dated July 9, 1901.

Our invention relates to the production of new disazo dyestuffs of considerable value by first tetrazotizing meta-diamidodiphenyl-urea or its homologues having the following general formula:



(X meaning in this formula a hydrogen atom which can be substituted by a methylic group,) and then combining the resulting tetrazo derivatives with suitable azo dyestuff components, as either with two molecules of beta₁-amido-alpha₃-naphthol-beta₄-sulfonic acid or with one molecule of this acid and one molecule of an aromatic sulfonic or carboxylic acid, such as salicylic acid, beta₁-naphthol-alpha₄-sulfonic acid, or the like.

The new dyestuffs produced in the above-defined manner are from red to reddish-brown powders which dissolve in water with a yellowish-red color. They dye unmordanted cotton from orange to yellow-red shades. When on fiber, these dyestuffs can be further diazotized and coupled with beta-naphthol. valuable bordeaux shades, which are fast to washing, being thus obtained.

The claim specifies the dyestuff obtained by first tetrazotizing the meta-diamidodiphenyl-urea and then combining the resulting tetrazo compound with two molecules of beta₁-amido-alpha₃-naphthol-beta₄-sulfonic acid.

PROCESS OF PRODUCING BLUE SULFUR DYE.

Adolf Kertesz, of Frankfort-on-the-Main, Germany, assignor to Leopold Cassella & Co., of same place. No. 678,884, dated July 23, 1901.

The object of this invention is to convert the blacks obtained by the use of the sulfur dyestuffs into blues by the action of air and steam under pressure. The claims are for:—

1. The process of producing blue dyes by treating with a mixture of air and steam at a temperature of over 100° centigrade, in the presence of an alkali, fiber previously dyed with the sulfur dyes obtained by treating primary substances with sulfur and sulfids.

2. The process of producing blue dyes by treating with a mixture of air and steam, in the presence of an alkali, fiber previously dyed with the sulfur dyes obtained by treating primary substances with sulfur and sulfids.

ORANGE DYE AND PROCESS OF MAKING SAME.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik, of same place. No. 679,172, dated July 23, 1901.

The inventor has found that phenyl-pyrazolone carboxylic acid combines readily with primulin sulfonic acid which has been diazotized on the fiber, giving rise to an orange tartrazin coloring-matter. In place of phenyl-pyrazolone carboxylic acid another homologous or analogous derivative thereof can be employed, such as can be prepared, for example, by condensing ortho or para tolyl-hydrazin, alpha or beta naphthyl-hydrazin, or para-nitro-phenyl-hydrazin with oxalyl-acetic ester and subsequent saponification of the condensation products thus obtained. The shades produced by combining these pyrazolone products with diazotized primulin sulfonic acid differ but little from one another. Those produced by means of the alpha-naphthylamin derivative are somewhat less bright than the others. In the present state of knowl-

edge the new coloring-matter can be regarded as a mono-azo compound. The procedure for obtaining these new shades consists in diazotizing primulin sulfonic acid on the fiber of the material to be dyed in the known manner and then passing the goods thus treated through a solution of the aliphyl-pyrazolone carboxylic acid chosen made alkaline by carbonate of soda. After leaving the goods in this solution for from ten to twenty minutes they are wrung out, rinsed, and otherwise treated as required.

The shades obtained on cotton by this method are orange and are hardly altered by treatment with dilute carbonate-of-soda solution or dilute hydrochloric acid. They are exceeding fast to soap and light.

BLUE SULFUR DYE AND PROCESS OF MAKING SAME.

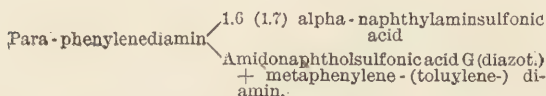
Julius Abel, of Mannheim, Germany, assignor to Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 679,199, dated July 23, 1901.

If equimolecular proportions of a dialkyl-para-phenylene-diamin thiosulfonic acid and a phenol be oxidized together—say, for instance, with potassium bichromate in acetic-acid solution—a dialkyl-amido-indophenol-thiosulfonic acid can be obtained. The inventor has discovered that new blue coloring-matter of great value can be obtained by moderately heating such a dialkyl-amido-indophenol-thiosulfonic acid—for instance, diamethyl-amido-indophenol-thiosulfonic acid—with sulfur and sodium sulfid. The coloring-matter so obtained contains sulfur and dyes unmordanted cotton in the presence of sodium sulfid blue shades. It can also be dyed from a vat in a manner similar to indigo. Various beautiful shades of blue are obtained which possess excellent fastness.

BLACK POLYAZO DYE AND PROCESS OF MAKING SAME.

Otto Ernst, of Hoechst-on-the-Main, Germany, assignor to Farbwerke, Vorm, Meister, Lucius & Bruening. No. 679,221, dated July 23, 1901.

If para-amidobenzene-azo 1.6 (1.7) naphthylaminsulfonic acid be treated with one molecular proportion of nitrous acid, the amido group of the benzene nucleus is changed into the diazo group and para-diazobenzene 1.6 (1.7) naphthylaminsulfonic acid is obtained. This diazoazo compound combines with chrysoidin from diazotized amidonaphtholsulfonic acid G and metaphenylene (metatoluylene) diamin in an alkaline solution in such a manner that a trisazo body is obtained of the constitution

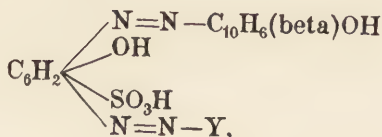


When dry, the dyestuff is a brown powder of metallic luster soluble in water with a dull-violet color and almost insoluble in alcohol. An addition of ammonia turns the color somewhat bluer. It is soluble in concentrated sulfuric acid with a gray-green color. An addition of water separates the dyestuff from this solution as a violet-blue precipitate. The dyestuff directly dyes cotton a deep black in an alkaline bath.

BLACK DISAZO DYE AND PROCESS OF MAKING SAME.

Karl Schirmacher, of Soden, Germany, assignor to Farbwerke, Vorm, Meister, Lucius & Bruening, of Hoechst-on-the-Main, Germany. No. 680,283, dated August 13, 1901.

The inventor has found that from ortho-ortho-diamido-para-phenolsulfonic-acid dyestuffs may be obtained of the general formula:



wherein Y means a phenol or amin of benzene, naphthalene, or their sulfonic acids. The process consists in combining the tetrazotized diamidophenolsulfonic acid with beta-naphthol and then with a second component—such, for instance, as alpha-naphthol, resorcinol, 2,7-dioxynaphthalene, 2,7. 2,6, 1,4, or 1,7-naphtholsulfonic acid, naphtholdisulfonic acid R, 1,8,4-dioxynaphthalenesulfonic acid, S, 1,4 and 2,6-naphthylamin-sulfonic acid, amidonaphtholsulfonic acid G. The disazo dyestuffs thus obtained are black powders soluble in water to a blue solution, their acid dyeings on wool being red-brown to brown, which on treatment with chromates turn to black shades. These dyeings are distinguished by great fastness.

The claims specify the disazo dyestuff which results from combining ortho-ortho-diamido-para-phenolsulfonic acid with one molecular proportion of beta-naphthol and then with one molecular proportion of 2,6-naphtholsulfonic acid.

BLUE ACID DYE.

Heinrich Polikier, of Berlin, Germany, assignor to Actien-gesellschaft fuer Anilin Fabrikation, of same place. No. 680,732, dated August 20, 1901.

It is well known that blue acid dyestuffs belonging to the diphenyl-naphthylmethane series may be produced by acting with sulfonating agents on the condensation products of tetra-aelkydiamidobenzophenone with one of the following amins: methyl, ethyl, phenyl, or tolyl alpha-naphthylamin (Patent No. 647,260) alpha-beta-dinaphthylamin, (British Letters Pa-

tent No. 30,015 of 1896.) or benzyl-alpha-naphthylamin, (Patent No. 496,435.) No statements, however, are given in literature as to the sulfonation of the product obtained from the above-mentioned ketone and alpha-dinaphthylamin. The inventor has now found that the said diphenylnaphthylmethane dyestuff may be easily transformed into the corresponding sulfonic acid, thus yielding a most valuable blue acid coloring-matter.

The dyestuff dissolves in concentrated sulfuric acid to a red solution, which on dilution with ice-water becomes gradually brown, greenish-brown, green, and finally clear blue. It dyes wool clear-blue shades of most valuable properties.

BROWN SULFUR DYES AND PROCESS OF MAKING SAME.

Wilhelm Epstein and Emil Rosenthal, of Frankfort-on-the-Main, Germany. No. 681,689, dated September 3, 1901.

This invention relates to brown sulfur dye and process of making same by heating with sulfur and sodium sulfid certain nitro compounds of benzidin and of its substitution products, which are obtained in treating the sulfuric-acid solutions of the respective bases with at least two molecules of potassium nitrate.

If the above nitro derivatives are heated together with sulfur and sodium sulfid, coloring-matters are obtained which vary according to the nitro compound used, from a yellowish-brown to reddish-brown and black.

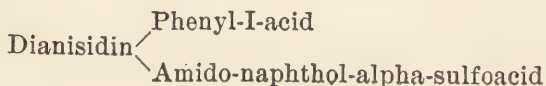
The dyestuffs dye unmordanted vegetable fibers from a hot or cold bath containing common salt, an addition of sodium sulfid to the bath not being required. The shades vary from yellowish-brown to reddish-brown and black and resist severe soaping, acids and alkalies. They are intensified by passing the dyed fabric through acetic acid and bichromate, copper sulfate, or similar oxidizing agents.

BLUE DISAZO DYE.

Walter Voiglaender-Tetzner, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 682,510, dated September 10, 1901.

The inventor has discovered that 2-phenyl-amido-5-naphthol-7-sulfoacid (hereinafter termed "phenyl-I-acid") is a valuable component for the production of substantive azo dyes, and both symmetrical and mixed dyes containing this component can be readily prepared.

The patent describes the mixed azo coloring-matter which can be obtained by the combination of one molecular proportion of tetrazotized dianisidin with one molecular proportion of phenyl-I-acid and one molecular proportion of 1.8 amido-naphthol-alpha-sulfoacid whose composition can be expressed by the formula:—



This is soluble in water with a blue color, to which solution the addition of hydrochloric acid, or caustic soda lye, produces a violet-blue to blue-violet precipitate. In concentrated sulfuric acid (containing about 96 per cent of H_2SO_4) it dissolves with a blue-green color and on reduction with zinc and dilute caustic soda lye yields a brown-red vat. The coloring-matter dyes unmordanted cotton pure blue shades.

BLUE DYE AND PROCESS OF MAKING SAME.

René Bohn, assignor to Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 682,523, dated September 10, 1901.

The inventor has discovered that by melting beta-amido-anthraquinone with caustic potash at a temperature of one hundred and eighty (180°) to three hundred (300°) degrees centigrade a leuco substance of a new dyestuff is formed. On treating the melt thus obtained with water and blowing air this leuco substance is oxidized and a blue crystalline substance separates out in the insoluble form, which is the new coloring-matter. The same coloring-matter can be obtained when in place of beta-amido-anthraquinone its sulpho-acid or hydrogenized derivatives of these substances are melted with caustic potash.

The new coloring-matter is insoluble in caustic soda or sodium carbonate solution, or dilute hydrochloric acid solution. It is soluble in nitrobenzene and difficultly soluble in aniline and chloroform, the solutions being blue-green, while it is almost insoluble in benzene and acetone. The new coloring-matter is, however, soluble in caustic-soda solution in the form of its leuco compound, which may be obtained by treating the coloring-matter with a suitable alkaline reducing agent—for example, sodium hydrosulphite in the presence of caustic soda, and in this form it exhibits the typical properties of a vat, dyeing textile fiber, especially cotton, blue shades of great brilliancy and excellent fastness.

BLUE MONOAZO DYE.

Oskar Kaltwasser and Hugo Jaesschin, of Berlin, Germany, assignors to Actien-Gesellschaft fuer Anilin Fabrikation. No. 683,119, dated September 24, 1901.

The inventors have found that a valuable monoazo dyestuff is produced if the diazo compound derived from 4-chloro-2-amidophenol sulfonic acid is combined with the 1.8-amidonaphthol-2.4-disulfonic acid.

The new dyestuff forms in the dry state a dark powder, easily soluble in water to a bluish-red solution, the coloration of which changes to red-violet on addition of sodium carbonate and to a fine red on the addition of caustic-soda lye. The

dye dissolves easily in concentrated sulfuric acid, forming a red-violet solution, which by dilution with ice-water turns bluish-red. It is but hardly soluble in alcohol to a bluish-red solution. When fixed on wool with the aid of copper salts, it yields fine blue shades, distinguished by their extraordinary fastness.

BLACK DISAZO DYE.

Oskar Kaltwasser and Hugo Jaesschin, of Berlin, Germany, assignors to Actien-Gesellschaft fuer Anilin Fabrikation. No. 683,120, dated September 24, 1901.

The inventors have found that a valuable disazo dyestuff may be produced by first combining 1.8-amidonaphthol-4-sulfonic acid in an acid solution with alpha-diazo-naphthalene and coupling, further, the monoazo dyestuff thus obtained in an alkaline solution with the diazo compound of 4-chloro-2-amidophenol sulfonic acid. The dyestuff thus produced dyes wool directly from an acid-bath black shades of a rather sufficient fastness, which shades by a subsequent treatment with an alkali-bichromate are deepened and assume at the same time an extraordinary fastness to soap and to milling. It is easily to be understood that this property is unexpected and remarkable in a coloring-matter containing two sulfo groups.

BROWN DYE AND PROCESS OF MAKING.

Richard Taggesell, of Buffalo, New York, assignor to Schoellkopf, Hartford & Hanna Co. No. 683,190, dated September 24, 1901.

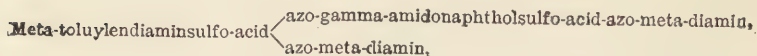
The claims cover:—

1. The method of producing a dyestuff which consists in diazotizing a meta-amidotolyloxaminsulfo-acid, combining the resulting diazo compound with gamma-amidonaphthol-sulfo-acid in an alkaline solution, heating the resulting com-

pound with a saponifying agent, tetrazotizing the product and combining this tetrazo compound with a meta-diamin of the benzene series.

2. The method of producing a dyestuff which consists in diazotizing a meta-amidotolyloxaminsulfo-acid, combining the resulting diazo compound with a gamma-amidonaphthol-sulfo-acid in an alkaline solution, heating the resulting compound with a saponifying agent, tetrazotizing the product, combining this tetrazo compound with a meta-diamin of the benzene series, and combining the resulting dyestuff with two molecules of a diazotized amidosulfo-acid.

3. The new dyestuff, derived from meta-amidotolyloxamin-sulfo-acid, represented by the general formula:



which is a dark powder, easily soluble in water, which it colors brown, soluble in concentrated sulfuric acid, which it colors brown and from which it is precipitated in dark flakes upon adding water, and dyeing unmordanted cotton a dark brown.

DYE FROM COTTON SEED AND METHOD OF MAKING SAME.

Thomas Newsome, assignor, by Mesne Assignments, to American By-Products Company, of New Jersey. No. 683,786, dated October 1, 1901.

This invention relates to the extraction of a coloring-matter contained in cotton seed. The trouble in extracting this color before has been that the extract of it contained a large amount of oil and fatty matter. By this process the material is treated with the vapor of a liquid hydrocarbon, such as naphtha. This extracts the oil, etc., and after this

treatment the coloring-matter is extracted in a steam extractor, after the material has been steeped in cold water for several hours. The aqueous extract may be used as a dye or may be concentrated by evaporation to reduce its bulk for handling, transportation, etc. This process relates only to the coloring matter of the cotton seed material and not to that of the root of the plant.

BLUE AZO DYE AND PROCESS OF MAKING SAME.

Hugo Jaesschin and Oskar Kaltwasser, of Berlin, Germany, assignors to Actien-Gesellschaft fuer Anilin Fabrikation. No. 684,065, dated October 8, 1901.

The inventors have found that a valuable monoazo dye-stuff is produced if the diazo compound derived from 4-chloro-2-amidophenol sulfonic acid is combined with the 1.8-amidonaphthol-3.6-disulfonic acid. This dyestuff when fixed on wool with the aid of copper salts yields shades which are distinguished by their extraordinary clearness. Moreover, they are neither uneven nor dull, which inconveniences will often occur if dyeing with coloring-matters susceptible of forming copper lakes is carried out in an acid-bath on the addition of copper salts.

VIOLET ACID DYE.

Heinrich Polikier, of Berlin, Germany, assignor to Actien-Gesellschaft fuer Anilin Fabrikation. No. 684,457, dated October 15, 1901.

It is known that derivatives of diphenyl-beta-naphthylmethane, owing to the fact that they contain a beta-naphthyl group, are easily converted by sulfonizing agents into new sulfonated dyestuffs remarkable for the purity and intensity of the tints they produce. On the other hand, until now it has been accepted that the corresponding derivatives of diphenyl-alpha-naphthylmethane do not yield any technically

valuable products when similarly treated. The inventor has now discovered that the derivatives of diphenyl-alpha-naphthylmethane obtained by condensing tetra-alkyl-diamido-benzophenone with methyl-phenyl-alpha-naphthylamin can be sulfonated without difficulty and are thus transformed into acid dyestuffs which dye wool a remarkably pure and intense violet.

BROWN ANTHRACENE DYE AND METHOD OF MAKING SAME.

Sigismund E. Simon, Belleville, New Jersey. No. 686,356, dated November 5, 1901.

This patent describes the process for producing a fast-brown dyestuff which is trioxyanthraquinone with the OH groups in 1-2-3 position. It is obtained by treating di-nitro-oxyanthraquinone, having the nitro groups in 1-3 position, with suitable reducing agents which do not affect the carbonyl groups. The reduction of the nitro groups to hydroxyl may be done directly or by first converting them into the amido compounds and then forming the hydroxyl.

BROWN SULFUR DYE AND PROCESS OF MAKING SAME.

Max Schuemann, of Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 687,072, dated November 19, 1901.

The inventor has discovered that if 2.4.1 dinitro-acetanilid (which can be obtained by the nitration of acetanilid) is heated with sulfur and sodium sulfid brown coloring-matters are obtained which dye cotton from the alkaline sulfid bath. The brown shades thus obtained possess a considerable fastness against washing, acids, and light, so that the subsequent treatment with chrome compounds or oxidizing agents, such as is usual with sulfur dyes, is unnecessary in the case of the new coloring-matters obtained according to the invention. The

shade obtained varies to a certain degree, according to the quantity of alkaline sulfid used in the process for their production, red-brown to pure-brown shades being obtained. If the dyed cotton be treated with copper sulfate, a pure brown results, and upon treating with chromates the shade becomes slightly yellower; but the fastness to washing, which before the treatment is excellent, is not improved.

DISAZO DYE AND PROCESS OF MAKING SAME.

Moritz Ulrich and Karl Heidenreich, of Elberfeld, Germany, assignors to the Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 687,171, dated November 19, 1901.

Our invention relates to the production of new disazo dye-stuffs by first tetrazotizing the disulfonic acid of para-paradiamidodiphenyl-urea and then combining the resulting tetrazo derivative with two molecules of beta₁-alpha₄-amidonaphthol, the sulfonic acids thereof, or the alkylized derivatives of these bodies, such as beta₁-alpha₄-amidonaphthol-beta₃-sulfonic acid, beta₁-ethylamido-alpha₄-naphthol-beta₃-sulfonic acid, or the like.

For the preparation of the hitherto-unknown disulfonic acid of para-paradiamidodiphenyl-urea we may use the following methods: Phosgene (COCl₂) is allowed to act in the presence of condensing agents on para-nitro-amidobenzene-meta-sulfonic acid and the resulting disulfonic acid of dinitrodiphenylurea is then reduced, or phosgene (COCl₂) is caused to act on the monosulfonic acid of para-phenylenediamin.

The new dyestuffs are from red to brown powders, which dissolve in water with from a red to violet color. They dye unmordanted cotton from red to reddish-violet shades which are distinguished for a great fastness to light.

BROWN SULFUR DYE.

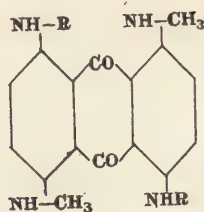
Heinrich Seidel, of Vienna, Austria-Hungary, assignor to Kalle & Co., of Biebrich-on-the-Rhine, Germany. No. 687,581, dated November 26, 1901.

The claim describes the new dyestuff containing sulfur, which is obtained by fusing waste lye resulting from the manufacture of sulfite cellulose after concentration together with alkaline sulfids and sulfur, and keeping the so-obtained mass at an elevated temperature until it is quite dry and friable. After grinding this is a black powder easily soluble in water, or concentrated sulfuric acid with brown color, insoluble in alcohol, the solution of which is concentrated sulfuric acid yields a dark-brown precipitate on addition of water, the aqueous solution of which is not changed by caustic-soda lye and it is precipitated by hydrochloric acid, and which dyes a deep brown on unmordanted cotton from a bath made up with Glauber or common salt and sodium sulfid, producing shades the fastness of which is increased by a subsequent treatment with chromium, copper or iron salts.

GREEN ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

Robert E. Schmidt, of Elberfeld, and Adolf Sertorius, of Flittard, Germany, assignors to Farbenfabriken of Elberfeld Company, of New York, N. Y. No. 687,657, dated November 26, 1901.

The invention relates to the manufacture of new green dyestuff sulfonic acids of the anthracene series by causing sulfonating agents to act on anthraquinone derivatives having the following general formula:



(R meaning in this formula an aliphyl radical, such as phenyl, tolyl, xylol, or the like.) The said anthraquinone derivatives can be obtained, for instance, by condensing the symmetrical paradinitro 1,5 dimethyldiamidoanthraquinone or the symmetrical paradibromo 1,5-dimethyldiamidoanthraquinone with primary aromatic amines. The resulting condensation products crystallize in the shape of dark-green or dark-greenish-blue crystals, insoluble in water, soluble in hot pyridine and aniline with a green color.

The new dyestuff sulfonic acids obtained from the above-mentioned bodies are in the shape of their alkaline salts dark powders soluble in hot water with a green color, which is not changed by the addition of alkalis. On being treated with oxidizing agents in a suitable manner 1,4,5,8-tetraoxanthraquinone is obtained. They dye unmordanted wool fine green shades.

The claim specifies the new dyestuff which can be obtained from symmetrical 1,5-dimethyl-diamido-4,8-diparatolyldiamidoanthraquinone.

BLUE ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

Robert E. Schmidt, of Elberfeld, and Adolf Sertorius, of Flittard, Germany, assignors to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 687,658, dated November 26, 1901.

This invention relates to the manufacture of new blue coloring-matters of the anthracene series by causing sulfonating agents to act on certain anthraquinone derivatives. The said anthraquinone derivatives named 1-methylamido-4- α -phenyl-amidoanthraquinones, can be obtained by means of several methods—for instance, by condensing 1-4-methylamidochloroanthraquinone, 1-4-methylamidobromoanthraquinone, or 1-4-methylamidonitroanthraquinone with primary aromatic amins, such as anilin orthotoluidin, paratoluidin, xylidin, or the like. The resulting condensation products represent dark-blue crystals insoluble in water, but readily soluble in chloroform and pyridin with a more or less greenish-blue color. By oxidation quinizarin is produced.

The new dyestuff sulfonic acids obtained from the above-mentioned condensation products by treating the latter with concentrated sulfuric acid, sulfuric monohydrate, or weakly-fuming sulfuric acid are in a dry state dark-blue powders which are readily soluble in water with from a pure greenish-blue to pure blue color. On treating their hot acidulated watery solution with a suitable oxidizing agent quinizarin is obtained. They dye unmordanted wool from acid-bath from pure greenish-blue to pure blue level shades, which are distinguished by their fastness to light.

The claims specifically cover the new dyestuff obtained from 1-methylamido-4-paratolylamidoanthraquinone.

BLACK DYE AND PROCESS OF MAKING SAME.

Oscar Mueller, of Buffalo, New York, assignor to Schoellkopf, Hartford & Hanna Co., of Buffalo, N. Y. No. 688,478, dated December 10, 1901.

The inventor has found that by coupling one molecule of the tetrazo compound of a paradiamin—for instance, benzidin, tolidin, or dianisidin—with one molecule of amidonaphtholdisulfo-acid H in a weakly-acidulated solution an intermediate product is formed which is capable of taking up one molecule of a diazo compound in an alkaline solution.

This new body may be coupled with amins or phenols, forming dyestuffs of great coloring power.

The dyestuff obtained from benzidin, amido naphtholdisulfo acid H, diazobenzene and metatolnylenediamin is a dark powder which is easily soluble in water, which it colors dark brown, and in concentrated sulfuric acid, which it colors bluish black, while it is not soluble in benzene or toluene. It dyes unmordanted cotton in a bath of Glauber salt a deep black with a bluish shade.

Instead of diazobenzene other diazo compounds of similar affinity or combining power can be employed. Instead of metatoluylenediamin other amins or phenols which combine, in the second place, with a tetrazo compound can be employed. Instead of tetrazodiphenyl other tetrazo compounds, such as tetrazoditolyl or tetrazodimethoxydiphenyl, may be employed. Metadiamin produces a deep black, phenol a greenish black or dark green, amidonaphtholsulfo-acid a bluish black, and naphtholsulfo-acid a violet black.

DYE OF THE ANTHRACENE SERIES AND PROCESS OF MAKING SAME.

Max Henry Isler, assignor to the Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 688,645, dated December 10, 1901.

This invention relates to the new coloring-matter which can be obtained from amido-anthraquinones and their derivatives and an aromatic amin. This is produced by carrying out the condensation in the presence of a weak alkali, such as sodium carbonate and sodium acetate. The coloring-matters obtained in this way yield much more brilliant shades than those obtained by condensation of the halogen-amido-anthraquinones without the presence of the alkali. In the form of its sulpho-acid the new coloring-matter is soluble in water with a violet-blue solution, and dyes unmordanted wool pure blue shades.

BLACK SULFUR DYE AND PROCESS OF PRODUCING
SAME.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 688,646, dated December 10, 1901.

In the specification of Patent No. 648,755 is described the production of a black coloring-matter which can be obtained by melting dinitro-di-para-hydroxy-diphenyl-meta-phenylene-diamin with sulfur and sodium sulfid. The inventor has now discovered that a new black coloring-matter different from that described in the specifications of the Patent No. 648,755 can be obtained by treating dinitro-chlor-di-para-hydroxy-diphenyl-meta-phenylene-diamin with sulfur and sodium sulfid. This new coloring-matter dyes unmordanted cotton bluer shades of black than the corresponding dyestuff obtained from dinitro-di-para-hydroxy-diphenyl-meta-phenylene-diamin, and these shades when subjected to the action of oxidizing agents—such as chromium salts, chromates, hydrogen peroxid, copper sulfate, steam containing air, and the like—become greener than do the shades produced by the dye obtained from the aforementioned unchlorinated meta-phenylene-diamin derivative.

The new chlor-dinitro-dihydroxy-diphenyl-meta-phenylene-diamin used as the initial material for the purposes of the present invention now prepared for the first time can be obtained by condensing dinitro-trichlor-benzene of melting-point 103.5° centigrade with para-amido-phenol in the presence of an agent that will bind hydrochloric acid—for instance, sodium acetate or sodium carbonate.

GREEN DYE OF THE ANTHRACENE SERIES.

Oscar Bally, assignor to the Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 683,576, dated December 10, 1901.

This invention relates to a new coloring-matter which can be obtained by treating the product described in Patent No. 656,081, with bromine or chlorine, and submitting the resulting product to the action of an aromatic amine, such as aniline, paratoluidine, etc. The halogen product is in itself a coloring-matter, and also that obtained after the treatment with the amine. This last product can also be sulphonated in the usual way.

The claims are for the process and dyestuffs obtained by treating mono-anilido-anthraquinone-mono-sulfo-acid with bromine and then melting the resulting halogen dissolved with an aromatic amine and sulfonating the product. This dyes either unmordanted or chrome mordanted wool green shades. The halogen compounds dye wool red.

BROWN-RED AZO DYE.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 688,647, dated December 10, 1901.

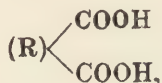
The claim covers:—

The azo coloring-matter such as can be obtained by combining diazotized chlor-amido-phenol-sulfo-acid with betanaphthol, which dyes wool brown-red shades; these shades becoming blue-black on treatment with bichromate of potash and carmine-red on treatment with copper sulfate, whose aqueous solution is violet-blue, the solution on the addition of caustic soda becoming red, which dissolves in concentrated sulfuric acid, the solution being fuchsin-red and giving a brown precipitate on the addition of water.

BROWN SULFUR DYE AND PROCESS OF MAKING SAME.

Christopher Ris, of Basle, Switzerland, assignor, by Mesne Assignments, to Aniline Color and Extract Works, (formerly John R. Geigy.) No. 688,885, dated December 17, 1901.

This invention relates to the production of new dyestuffs containing sulfur dyeing unmordanted cotton in brown shades, which are produced by melting metatoluylenediamin together with a suitable dicarboxylic acid of the general formula:



wherein R stands, for instance, for phenylen, ethylon, or analogous residues and with poly-sulfids of alkali. The following dicarboxylic acids may be used: phthalic acid or its anhydrid, succinic acid or its anhydrid, thiodiglycolic acid, and oxalic acid.

The manufacture of the coloring-matters can be performed in two ways—that is to say, either the metatoluylenediamin may first be transformed into an acidyl derivative by melting the same with the dicarboxylic acid or the latter may directly be added to the mixture of metatoluylenediamin with the polysulfid of alkali. In both cases the best proportions which seem to correspond with the chemical process are those of two molecules of metatoluylenediamin and one molecule of the dicarboxylic acid; but they may always be varied within certain limits. Instead of metatoluylenediamin a nitro compound may be used, which by a treatment with reducing agents furnish this base—viz., ortho-nitro-para-toluidin or para-nitro-ortho-toluidin.

BLUE ACID DYE.

Heinrich Polikier, of Berlin, Germany, assignor to Actien Gesellschaft fuer Anilin Fabrikation. No. 688,966, dated December 17, 1901.

In another specification are described the basic dyestuffs which were obtained by condensing alkylated derivatives of meta-tolyl-alpha or beta-naphthylamin with tetra-alkyldiamidobenzophenone. In carrying the researches about this subject further the inventor has now found that the above-mentioned coloring-matters, by a treatment with sulfonating agents, are easily converted into the corresponding sulfonic acids, which also form valuable dyestuffs, distinguished by their fastness to washing.

The dyestuff dissolves in concentrated sulfuric acid to a brown-red solution, which on gradual dilution with ice-water becomes greenish-brown, green, and finally clear blue. It produces on wool blue shades of great intensity.

BLUE DYE.

Heinrich Polikier, of Berlin, Germany, assignor to Actien Gesellschaft fuer Anilin Fabrikation. No. 688,967, dated December 17, 1901.

The inventor has found that the alkylated derivatives of meta-tolyl-alpha- or beta-naphthylamin may easily be condensed with tetra-alkyldiamidobenzophenone, thus yielding most valuable dyestuffs, which are distinguished by the excellent clearness of their shades and by their extraordinary fastness to alkalis. This latter property is the more astonishing as the blue coloring-matters of the triphenyl and diphenyl naphthylmethane series hitherto known in the market generally are more sensitive to alkalis, the shades of the Victoria blues, for instance, being considerably changed by the action of ammonia.

The new basic dyestuff produced by condensing alkyl-metatoyl-naphthylamin and tetra-alkyldiamidobenzophenone with the aid of phosphorus oxychlorid dissolves in concentrated sulfuric acid to an orange-brown solution, which on gradual dilution with ice-water becomes greenish-brown, green, and finally clear blue.

The dyestuff produces on wool clear-blue shades of great intensity.

The result is not essentially changed if for methyl-metatoyl-beta-naphthylamin employed in the above example one of the other basis above-mentioned is substituted or if for tetrametnyldiamidobenzophenone is substituted tetroethyldiamidobenzophenone.

BASIC RED-VIOLET DYE AND PROCESS OF MAKING SAME.

Friedrich Runkel, of Elberfeld, Germany, assignor to Farbenfabriken, of Elberfeld Company, of New York, N. Y. No. 689,025, dated December 17, 1901.

This invention relates to the production of new reddish-violet dyestuffs by condensing in the presence of mineral acids the auramins with the alkylated derivatives of alpha-methylindol, (methylketole,) in which the imido-hydrogen is replaced by methyl or ethyl. In this process the group NH_2 of the auramin is replaced by the radicals of the methyl or ethyl alpha-methylindols, the ammonium salts of the respective mineral acid being formed as by-product, and the salts of the bases of the new coloring-matters are thus produced directly. The said new dyestuffs are in the shape of the mineral-acid salts, dark-brown powders, which are readily soluble in water with a reddish-violet color. They are also readily soluble in alcohol with a reddish-violet color and are dissolved by concentrated sulfuric acid of 66° Baumé with a yellowish-brown color. They dye cotton mordanted with tannin, wool, and silk reddish-violet shades fast to the action of dilute mineral acids and to the action of dilute caustic alkalies and ammonia.

The claims specify the dyestuff which can be obtained from pure auramine G and methyl-alpha-methylindol.

BROWN SULFUR DYE AND PROCESS OF MAKING SAME.

Richard Otto Fr. Hailer, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 690.271, dated December 31, 1901.

The inventor has discovered that on treating symmetrical hexanitro-diphenylamin (see Beilstein, Handbuch der Organischen Chemie, third edition, Vol. 2, page 340) with sulfur and sodium sulfid a valuable new coloring-matter is formed which dyes cotton directly brown shades. The dyeings produced on cotton by its use are brown and exceedingly fast, and on treatment with chrome alum and copper sulfate or with potassium chromate or with copper sulfate and acetic acid the dyeings become somewhat deeper; but on treatment with potassium chromate and sulfuric acid or with hydrogen peroxid the dyeings become somewhat lighter. The dyeings can be developed by means of diazo compounds on the fiber, or they can be diazotized on the fiber and coupled with suitable dyestuff components—for instance, beta-naphthol—whereby various valuable and fast shades can be produced.

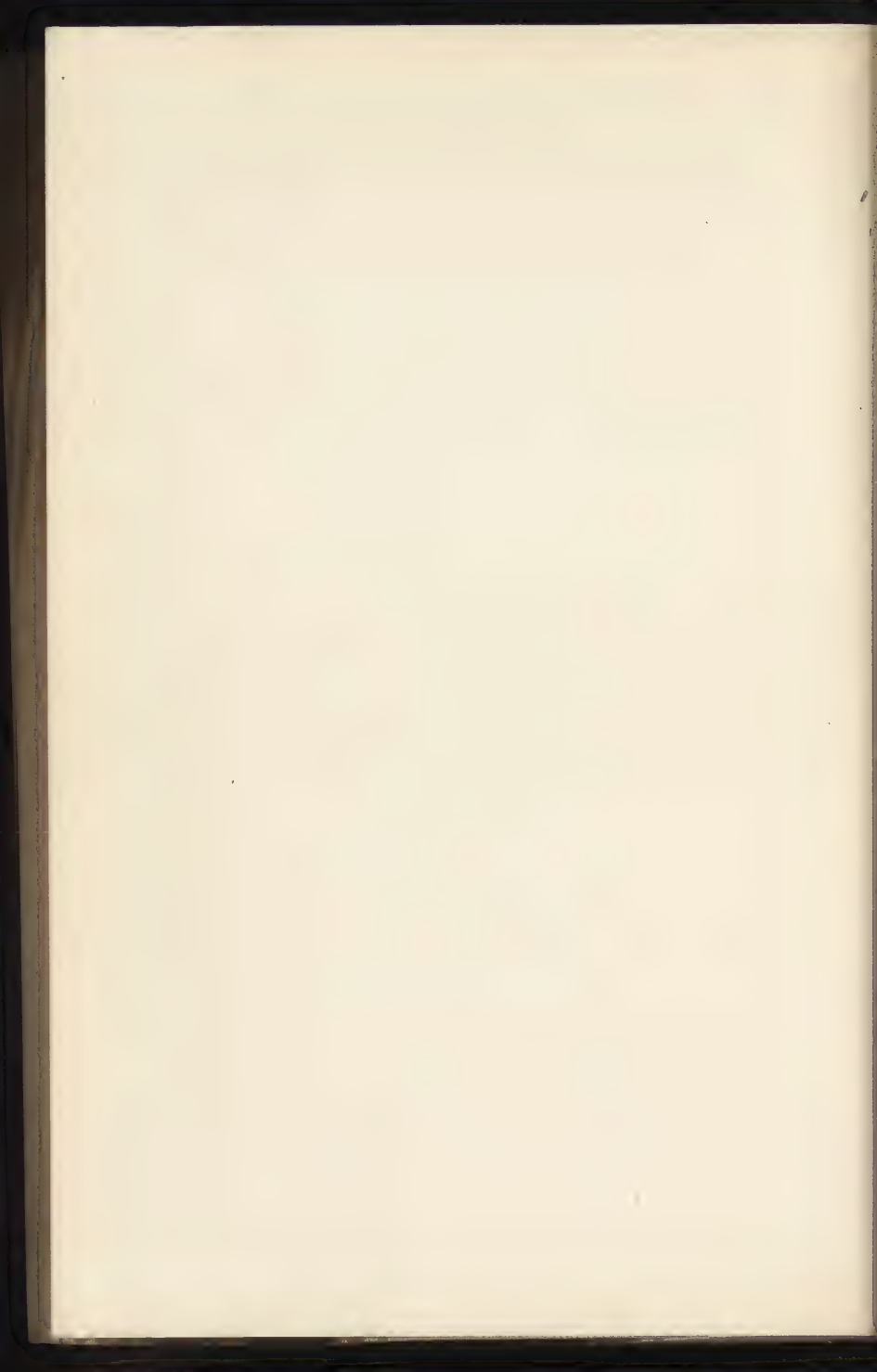
ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

Max H. Isler, of Mannheim, Germany, assignor to Badische Anilin and Soda Fabrik. No. 690.292, dated December 31, 1901.

Upon treating mono-amido-beta-methyl-anthraquinone with bromin brom-amido-methyl-anthraquinone is obtained. If this brominated body be treated with potassium nitrite in concentrated sulfuric acid on water-bath, the amido group is replaced by a hydroxyl group. Similarly, also, an analogous chlorin

derivative can be obtained. The inventor has discovered that this brom- or chlor-hydroxy-methyl-anthraquinone can readily be made to react with aromatic amines, whereby new coloring-matters are produced, which in the form of sulfo-acids dye wool violet shades of greater brightness than those obtained from any alizarin colors hitherto known.

The claim specifies the new coloring-matter such as can be obtained by condensing brom-hydroxy-methyl-anthraquinone with para-toluidin. In its sulfonated form this is soluble in water and dyes unmordanted wool pure violet shades.



MACHINES APPLIED TO
DYEING, ETC.



MACHINES APPLIED TO DYEING, ETC.

DYE-VAT.

Adolf Urban, of Sagan, Germany. No. 665,646, dated January 8, 1901.

The claims relate to the particular construction and cover:—

1. In a dyeing apparatus the combination with a vat having a central passage-pipe, a steam-pipe in the bottom of the vat, a perforated top and false bottom in said vat and a partition having a water seal between said false bottom and the bottom of the vat.

2. In a dyeing apparatus, the combination of a vat having a central passage-pipe, two bottoms, one of which is perforated and a water seal with slides for opening and closing the water seal in the manner described and for the purpose named.

APPARATUS FOR DYEING, ETC.

Charles Loxton Jackson and Edward Wilson Hunt, of Bolton, England. No. 666,056, dated January 15, 1901.

This invention relates to improvements in the means for scouring, bleaching, dyeing, mercerizing, or otherwise treating piece goods in an open or expanded condition and by a simple and economical process which obviates the creases caused by running fabrics in the rope form and prevents the selvages curling up and creasing, such creases subsequently showing and marking the goods when dyed in light and delicate shades.

In one arrangement for carrying the invention into effect a suitable keir of any convenient size and form and strong

enough to resist any required steam-pressure is used. This keir is provided with a door capable of being hermetically closed and with rails on which wagons of a special form containing the piece goods to be bleached or otherwise treated can be run into and out of the keir. The wagon consists of any convenient carriage, upon which are mounted two end frames, with bearings for two batch-rollers, on one of which when the wagon is out of the keir a full batch of cloth is placed, while an empty batch-roller is placed upon the other bearings. The lower part of the carriage supports a transverse shaft upon the ends of which are pivoted two upright arms, slotted at their upper ends. A large hollow drum, preferably perforated, has its bearings in the slots of the pivoted arms, and this drum lies in contact with the cloth on both batch-rollers while it is being wound from one roller to the other, thus preventing the selvage of the cloth from curling or turning up.

COP-CARRIER FOR DYEING-MACHINES.

James Major, of Eccles, England. No. 666,902, dated January 29, 1901.

This invention relates to the construction of the cop-carriers used for holding cops of spun yarn in apparatus for dyeing, bleaching, and similar operations, and is more particularly applicable to that class of apparatus wherein the dye or other liquor is forced or drawn in through the center of the cop and expelled in an outward direction, or vice versa; and the objects of this present invention are to hold the cop firmly on the carrier and at the same time give free access for the dye or other liquor to the interior of the cop.

The claims are for:—

1. An improved spindle or cop-carrier for holding cops of spun yarn during dyeing, bleaching and similar operations consisting of two narrow grooved or semi-circular blades of thin metal spring-fastened together at the point, the central

portion being bulged outward and their butt-ends slightly separated and secured in a hollow cylindrical plug.

2. An improved spindle or cop-carrier for holding cops of spun yarn during dyeing, bleaching and similar operations, consisting of two narrow grooved or semi-circular blades of thin metal spring-fastened together at the point, the central portion being bulged outward and their butt-ends slightly separated and secured in a hollow cylindrical plug, and a taper screw-thread on the outside for screwing up and binding the edges of the blades in the slits.

APPARATUS FOR WASHING WOOL.

Henry Grant Laying, of South Amboy, New Jersey. No. 667,231, dated February 5, 1901.

This invention relates to that class of apparatus intended for washing wool, cotton, pith, and other materials; and my invention consists of an apparatus in which there is a narrow trough for receiving the material, a conveyer for carrying it along the trough, and means for injecting streams of wash liquor against the advancing material, so as to subject the material to the action of fresh wash liquor and reduce the amount of liquor required, and as illustrated in the accompanying drawing, in which the figure is a longitudinal view, in part section, illustrating one form in which the improved apparatus may be embodied.

The material to be operated upon is conveyed along a trough H, of any suitable form and is maintained in motion through the medium of any suitable conveyer. As shown the conveyer is an endless belt provided with a series of arms carrying flights or wings, conforming in outline to the transverse sectional form of the trough, the said belt passing around wheels and supported intermediate these wheels, if necessary. The wheels or either of the same may be driven from any suitable source of power.

APPARATUS FOR DYEING, &c.

James Major, of Eccles, England. No. 667,825, dated February 12, 1901.

This invention relates to improvements in or appertaining to the apparatus for which U. S. patents were granted to the inventor, numbered 644,988 and 644,990, both dated March 6, 1900; but said improvements are also equally applicable to other similar apparatus mounted on a cop-carrier fixed at the lower end of a vertically-situated revolving spindle, which is immersed in a tank containing the dye or other liquor with which the cops are to be treated.

The objects of the present invention are to double the production of each machine or apparatus without materially increasing the cost of the same and to enable the cop-carriers to be easily and expeditiously removed from the spindles.

APPARATUS FOR THE TREATMENT OF WOOL.

Arthur Gartrell Dear, of London, England. No. 668,502, dated February 19, 1901.

This invention relates to improvements in apparatus for removing grease, gum, and other impurities from wool or other animal fibers, as well as vegetable fibers, and for drying and bleaching the same.

According to this invention the fiber to be treated is first passed through a tank containing a suitable chemical solution for the removal of grease, gum, or other impurities and is then arranged and washed with chemical solution or water in a shallow tank or tray open at one end, through which a flow of water passes, and it is then squeezed or pressed to remove excess of water or chemical solution. The fiber is then loosened or opened out by being passed over a rapidly-rotating roller or beating-drum. The fiber is then bleached and dried by being passed, by means of endless bands, through a chamber, in which it is subjected to the action of heated air or bleaching-gas. The air is exhausted from this bleaching or drying cham-

ber on the opposite side of the fiber to that at which air or a bleaching-gas is admitted, and the said chamber is provided with suitable means for heating the air or bleaching-gas before it comes into contact with the fiber.

The endless bands by which the fiber is conveyed through the apparatus are composed of suitable metal wires bent into a rectangular form or half-mesh, the angles of one wire interlacing, but not locking, with angles of the adjacent wire on either side. The ends of the wires at the edges of the band are turned over or clenched, and the sides of the band may be bound with canvas or other suitable material. These bands afford the firmness of a fixed or locked mesh, combined with a sufficient degree of elasticity, and may be employed both to carry the fiber and as driving-bands.

The rollers or drums carrying the aforesaid endless bands have their centers of greater circumference than their ends and have their ends flanged.

The beating-drum is provided with projections on its periphery, which projections serve to loosen the fiber and feed it forward.

MACHINE FOR DYEING.

Joseph Steenberghe, of Molenbeek, near Brussels, Belgium.
No. 668,694, dated February 26, 1901.

The machine for dyeing hanks of yarn which forms the object of the present invention is devised especially for the dyeing of cotton yarn in indigo-vats, and it admits of the practical realization of this delicate operation, which has hitherto always necessitated very skilled dyers whose hands were repeatedly attacked by the dye liquid.

According to this improved system the machine is mounted upon a traveling frame above a series of vats containing the graduated baths. The machine effects the dipping and then expresses the excess of the dye absorbed by the yarn by squeezing the same without twisting it and without disturbing the threads, so that the subsequent pressing or straining of the said yarn is no longer requisite.

The apparatus includes the following essential parts, namely: first, a dipping-roller rotated above the bath and arranged to pass though the hank of yarn to be dipped; second, a stretching-roller also passing through the yarn and capable of being moved away from the dipping-roller for the purpose of stretching the said yarn out of the bath and above the vat, and, third, a compression-roller which can be caused to approach the dipping-roller for the purpose of squeezing the yarn between these two rollers, so as to express the excess of dye taken up.

MACHINE FOR MERCERIZING, &c., FIBER AND YARN.

Henry Frederick Augustus A Brassard, of Bradford, England. No. 670,098, dated March 19, 1901.

This invention relates to a machine for treating slivers of cotton, wool, and other fiber and yarn with liquids.

The machine is especially suitable for mercerizing cotton, but may be employed with equal profit for similar other purposes.

The treatment of the fiber takes place step by step, and to attain the end in view several baths and thereto-belonging mechanisms are arranged one after another.

DYEING MACHINE.

Joseph Hussong, of Camden, N. Jersey. No. 671,799, dated April 9, 1901.

The claims cover:—

1. The combination in a dyeing-machine, of a vat, a frame for the yarn, sticks supported in said frame, and slats on the frame above said sticks spaced a sufficient distance apart to allow the liquor to circulate, substantially as described.

2. The combination of a vat, a frame supporting the yarn, yarn-sticks carried by said frame, a series of slats above the

yarn-sticks, and spaces between the slats, said spaces being directly above the yarn-sticks, substantially as described.

3. The combination of a vat, a frame supported by the vat, said frame having slotted side members, loose sticks mounted in the slots, and slats secured to the side members and spaced a given distance apart, the spaces being directly above the yarn-sticks, substantially as described.

4. The combination of a vat, a frame for the yarn, said frame consisting of longitudinal side members and cross-bars, from which the side members are suspended, said bars resting upon the vat, a series of slats spaced a given distance apart, said slats extending from one side of the frame to the other, a series of detachable yarn-sticks mounted in slots in the side members under the spaces formed by the slats.

APPARATUS FOR MERCERIZING.

Edwin J. Nelson, of Middleville, New York. No. 671,867, dated April 9, 1901.

The object of the invention is to provide improved apparatus for mercerizing yarn which will insure that the yarn while being mercerized will undergo no accidental variations in tension, but that all portions alike will be subjected to uniform tension, and thus produce perfect results when dyed; and to this end said invention consists in the apparatus having the features of construction as specified.

In the mercerizing of yarn as commonly practiced by the placing of skeins of yarn on parallel rods or shafts the dyed product is faulty in that the appliances heretofore used have not been such as to keep all portions of the yarn under equal or uniform tension. Those portions of the yarn under the least tension, being least affected by the mercerizing fluid, will dye differently from the other portions, the result being that the fabric or goods made from the yarn will not be of uniform color. Again, it has been found that the best results in mercerizing are obtained by stretching the yarn before it is

placed in the fluid and then while it is still submerged therein to increase its tension. It is apparent, therefore, that an apparatus to meet the conditions required for the securing of the best results must not only be such that inequality of tension will not exist, but also it must be capable of increasing the tension while the yarn is still submerged, and to be entirely practical the apparatus must not be bulky or clumsy to handle or complex and it must permit the most easy and rapid placing of yarn upon and its removal from the supporting rods or shafts. The inventor claims that his construction of a machine will accomplish these results.

APPARATUS FOR DYEING.

William Mather, of Manchester, England. No. 672,645, dated April 23, 1901.

In the patent specifications Nos. 653,580, 653,581, and 662,281 the inventor has described means of treating fabrics in their full width rolled upon mandrels with liquids, gases, or vapors. Some of the operations required for bleaching and dyeing fabrics so rolled involve the use of chemicals which act upon iron vessels and apparatus, damaging them and also coloring objectionably the liquids employed.

The present invention relates to apparatus made of material which is not acted on by the liquids employed.

The claim covers:—

In apparatus for bleaching, dyeing and otherwise treating fabrics, a tank made of or lined with material that is not attacked by the liquids employed, this tank having at its one end a retractile seating for the bearing of the one end of a roll-mandrel, and having at the other end a retractile centering-plunger for the other end of the mandrel, and having mounted in a bearing a perforated disk and gearing for causing it to revolve.

MERCERIZING-MACHINE.

Frank Shuman, of Philadelphia, Pennsylvania. No. 673,067, dated April 30, 1901.

The object of this invention is to provide a suitable construction of mercerizing-machine adapted to carry on a continuous process whereby there is no loss of time due to the stoppage of the machine or handling of the yarn. The process which my improved machine is designed to perform may be briefly stated as one in which the yarn is placed on the machine in skeins in loose condition. It is then automatically conveyed along the machine and mechanically stretched and while in this condition subjected to the action of the caustic alkali. While so stretched it is next subjected to a washing action, and subsequently it is relieved of this stretched condition and is removed from the machine, said process taking place continuously with each skein of yarn in rapid succession and without stoppage or interference to the normal running of the machine. If desired, the stretching operation may be uniform or variable, as desired, in the latter case the tension being increased and decreased during the mercerizing operation. The claims describe the details of construction.

DRIER.

Frederick G. Sargent, of Graniteville, Massachusetts. No. 675,068, dated May 28, 1901.

This invention is applied to a wool-drying machine of the type in which a traveling apron passes through a closed chamber, carrying a layer of wool slowly from the feed end to the discharge end of the chamber, while a current of heated air is caused to circulate through the layer of wool to abstract the moisture therefrom.

The novelty consists in placing metallic plates near the material to be dried. By radiation, it is claimed, these plates give out additional heat and so aid in drying the stock.

WOOL-WASHING MACHINE.

Frederick G. Sargent, of Graniteville, Massachusetts. No. 675,069, dated May 28, 1901.

This patent describes improvements in construction of wool washing machines of the type which comprises a long bowl containing the scouring liquor, at one end of which the wool enters, is then raked along by a harrow and passes out through squeeze rolls at the other.

The claims describe the details of construction.

DRIER.

Frederick G. Sargent, of Graniteville, Massachusetts. No. 675,070, dated May 28, 1901.

This invention relates to machines for drying wool, cotton, and other fibrous substances, and more especially to driers in which the construction comprises, essentially, a chamber or closed compartment through which currents of air are circulated by suitable means and in which chamber or compartment the material to be dried is supported on an open-work screen, so as to be exposed as much as possible to the evaporating power of such currents.

The particular species of drier to which some of my improvements are especially applicable and in connection with which the invention is herein presented is that wherein the screen moves through the drying-chamber, the material that requires to be dried being deposited upon such traveling screen at one portion of the machine and being removed or delivered therefrom at another portion of the machine. The form of traveling screen that is shown and described herein is that usually employed—namely, it consists in an endless reticulated belt or apron running over drums that are located at or near the opposite ends of the drying-compartment. Upon this apron is delivered automatically or by hand a bat or layer of fibrous or other material impregnated with moisture, and the same is submitted during its progress through the machine to the currents of air aforesaid.

APPARATUS FOR DEGREASING WOOL.

Georges Peltzer, of Verviers, Belgium. No. 675,406, dated June 4, 1901.

This invention relates to apparatus for extracting fatty matters from wool by the solvent action of carbon tetrachlorid, the apparatus being so arranged that the tetrachlorid, being of greater specific gravity than water, acts under water and is thereby protected from exposure to air and against loss by evaporation.

The claim describes an apparatus for extracting fat from wool by means of carbon tetrachlorid the combination of a tank made in two compartments adapted to contain carbon tetrachlorid and water, in the one compartment a feeding-roller and propelling devices, in the other compartment two pairs of squeezing-rollers, propelling devices, traveling aprons and delivery-roller, a water-sealed cover, an air-pump, air heater and cooler of the air charged with tetrachlorid and a pipe leading thence to the first compartment.

APPARATUS FOR EXTRACTING FAT FROM WOOL.

Georges Peltzer, of Verviers, Belgium. No. 675., dated June 4. 1901.

The claim is for:—

In an apparatus for extracting fat from wool by means of carbon tetrachlorid, a closed chamber having a feeding device and a tank for tetrachlorid at one end, a traveling apron inclining upward from said tank i a straight line with means for supporting the same, pressure-rollers above said apron, supply-nozzles for delivering showers of carbon tetrachlorid on the passing wool between said rollers and a washing apparatus into which the treated wool is discharged.

APPARATUS FOR DEGREASING WOOL.

Georges Peltzer, of Verviers, Belgium. No. 675,408, dated June 4, 1901.

This invention relates to certain additions to and modifications of wool-washing apparatus of known kind, so as to render them available for removing fat from raw wool by means of carbon tetrachlorid.

The claim covers:—

In a wool-cleaning apparatus, the combination of a tank having means for propelling the wool. feeding means at one end thereof, a casing over it forming a liquid seal, a second casing arranged to exclude air from the contents of a tank, a channel extending from said casing, a washing-tank at the end of said channel, a delivery-roller therein, and steam and water distributing nozzles between said propelling means and washing-tank.

APPARATUS FOR DYEING.

Eugene Emile Plantrou, of Oissel, France. No. 676,151, dated June 11, 1901.

This invention, which relates to bleaching, dyeing, washing, and similarly treating all kinds of textile materials in whatever state of preparation, is based upon the utilization and application of a unique principle of great simplicity. This principle consists in the introduction of the liquids by which the treatments are to be effected, which liquid is hereinafter called the "bath," under pressure below the compressed mass of material to be treated in such a manner that the bath thus introduced rises throughout its whole extent and traverses the materials in a vertical direction, thus naturally extruding the air contained in the materials and effecting an absolutely complete wetting. It is easily understood that if it be desired to wet any such dry materials as wool, silk, cotton, and the like by passing the liquid downward through them, as at present practiced, or even horizontally, unwetted parts are found when

the liquid has passed, since the travel of the liquid prevents the escape of the whole of the air. This process alone permits the complete expulsion of the air, because it is normally attacked from below by a body having a considerably greater density. The inventor has devised an apparatus, which is hereinafter described, for the industrial application of this principle. This apparatus is much more simple and is capable of a larger output than any other apparatus of a similar kind hitherto known. It supersedes apparatus in connection with which a vacuum or the use of keirs and autoclaves is necessary.

MACHINE FOR DYEING, &c.

Charles E. Drew, of Philadelphia, Pennsylvania, assignor of one-half to the Frieberger Manufacturing Company, of Pennsylvania. No. 676,222, dated June 11, 1901.

This invention has for its object the production of a machine in which dyeing, bleaching, scouring, and the like may be carried on and produce a satisfactory result. It consists in certain mechanisms and constructions, fully described in the claims which cover the details of construction.

CLOTH-DRYING MACHINE.

Charles Ward Russell, of Providence, Rhode Island. No. 678,136, dated July 9, 1901.

This invention has reference to an improvement in machines for drying cloth; and it consists in the peculiar and novel construction and the combination of parts.

To secure the rapid drying of cloth, heat has to be applied to facilitate the rapid evaporation of the water and air to remove the vapor from the cloth. The machines used for drying cloth may be divided into fan drying-machines, in which the cloth is passed around (usually revolving) cylinders, and steam-coil drying-machines, in which the air is heated by the steam-

coils and passed through or among the cloth. In fan drying the direct contact of the cloth with the heated cylinders imparts a stiffness to the cloth similar to ironing, while in the steam-coil machines a great deal of heat is wasted and a long frame is required to secure the drying of the cloth in one passage through the frame.

The main object of this invention is to economize space and steam, while more thoroughly drying the cloth, as will be more fully set forth hereinafter.

The improved machine is adapted to woolen, linen, cotton, and other cloth of different widths. The cloth may be stretched and tentered during its passage through the machine, and a swissing motion may be given to the cloth, if desired.

MERCERIZING-MACHINE.

Adolf Kertesz, of Mainkur, near Frankfort-on-the-Main, Germany. No. 679,425, dated July 30, 1901.

It is well known that during that process of treating cotton to give it the appearance of silk, known as "mercerization," it is essential that the tissue should be under constant tension. The machines heretofore used for that purpose are either machines constructed after the general plan of tentering-frames, in which the tissue is stretched by the tentering-chains, or machines in which the tissue runs over openers to prevent shrinking. The machines first above named are very satisfactory as far as regards quality of production, since the tissue being seized at the selvages shrinking is practically entirely prevented; but the quantity of production is limited. The machines of the second kind above named yield a larger production; but the shrinking force of the tissue when subjected to the action of the caustic lye is so great that the tissue cannot be entirely prevented from shrinking by merely resting on the various opening appliances now in use, and thus the mercerizing effect is materially diminished. The inventor has discovered that the stretching of the tissue while being mercerized can be accomplished in a very simple and satisfactory

manner by passing the tissue between matched corrugated rolls, so that the tissue is forced to conform to the corrugations during its passage. Owing to this special corrugated surface of these rolls between which the tissue passes and to the corrugated surface of which it is compelled to conform the wet tissue not only is firmly held, but is at the same time sufficiently stretched and kept stretched to insure the best effect.

MERCERIZING APPARATUS.

William Henry Crompton and William Horrocks, of Radcliffe, England. No. 680,131, dated August 6, 1901.

This invention relates to improvements in machines for mercerizing and the like treating—say scouring, bleaching, dyeing, washing, and sizing—yarn in hank form, the object being chiefly to provide a machine whereby the mercerizing of yarn in hank form is rendered continuous and a better silk luster can be obtained.

The claims cover the details of construction.

REVERSING APPARATUS FOR DYE-VATS, &c.

John T. Travis, of Paterson, New Jersey, assignor of one-half to Norval Bradley, of same place. No. 680,553, dated August 13, 1901.

The invention relates to reversing apparatus for dye-vats and other machines.

The object of the invention is to provide apparatus of this character which shall be simple of construction, durable in use, comparatively inexpensive of production, and by means of which the fabric under treatment will be automatically passed back and forth through the dye liquor from a drum mounted at one end of the vat to a drum mounted at the opposite end, thus dispensing with the employment of an operator for each machine to reverse the direction of movement of the cloth and making it possible for one operator to attend to a large num-

ber of machines at the same time, as his attention is only required in stopping and starting the machine.

With this and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts.

APPARATUS FOR DYEING.

William Mather, of Manchester, England. No. 682,099, dated September 3, 1901.

This invention relates to improvements in apparatus for bleaching and dyeing fabrics in a rolled condition. It consists in improvements upon Patents Nos. 653,580, 653,581 and 662,261.

The claims cover:—

1. In an apparatus for bleaching and dyeing fabric, mandrels on which the fabric is rolled and from which it is unrolled, supporting means therefor, trucks for suitably supporting the rolls of fabric, each of which is provided with a circumferentially-tooth front, a keir for receiving the trucks and rolls of fabric, means engaging the toothed front of the trucks for rotating said rolls of fabric within the keir, a tank provided with means for supporting the mandrel carrying the fabric, an end chamber for said tank having a perforated front wall with its periphery toothed, means for retaining the mandrel carrying the fabric within the end chamber, means for rotating said end chamber, causing thereby the rotation of the mandrel retained in the end chamber and means for circulating liquid through said end chamber and tank.

2. Apparatus for bleaching and dyeing fabrics in their full width, comprising mandrels on which the fabric is rolled or from which it is unrolled, frames provided with bearings for the mandrels, trucks having bearings for mandrels and end chambers with perforated fronts adapted to have the rolls of fabric pressed against them, said front being circumferentially toothed, a track for the trucks, a keir adapted to receive the

trucks, and provided with a tightly-closing door, and with gearing to engage the toothed peripheries of the end chamber of the trucks, a tank made of material not attacked by bleaching or dyeing liquids having bearings for a mandrel and a rotatable end chamber with perforated front and toothed periphery, a gear adapted to engage the said periphery and rotate the chamber, and a rotary pump and pipes for circulation of liquids through the tank and its end chamber.

DRYING-CYLINDER.

James H. Whittle, of Worcester, Massachusetts. No. 683,-237, dated September 24, 1901.

The object of this invention is to provide a more uniform distribution of heat throughout the entire length of the cylinder and to remove the water of condensation therefrom; and it consists in the construction and arrangement of parts.

APPARATUS FOR BLEACHING ANIMAL OR VEGETABLE FIBER AND FABRIC MADE THEREFROM.

Frank J. Briggs, of Everett, Massachusetts, assignor of one-third to Henry A. Locke and George F. Tarbell, of Cambridge, Massachusetts. No. 684,182, dated October 8, 1901.

This apparatus is particularly intended for use in the process of bleaching paper-pulp made of wood or animal hair or fabric made from animal or vegetable fiber, which is often bleached after it has been made into fabric.

The common methods now in use for bleaching animal or vegetable fiber are confined to the employment of chlorid of lime, which is dissolved in water, thereby forming the bleaching liquor and the electrolysis of chlorid of sodium, whereby chlorin gas is formed at the positive and caustic soda at the negative pole. The machinery and mechanical appliances employed for the collection of the chlorin gas after electrolysis has taken place, as well as the tanks, cells, &c., which are

used for forcing the chlorin gas into a prepared solution of lime and water, thereby forming a bleaching liquor, are very expensive and quite intricate. The pulp is run into a large tank and the bleaching liquor is mixed with it by an agitator, the length of time required depending on the strength of the liquor used.

In this invention or improvement the above described process is avoided. By the use of a diaphragm, and by the protection and disposal of platinum electrodes and the use of sulfurous acid, together with the direct application of electricity to a solution of chlorid of sodium and water into which the animal or vegetable fiber has been placed, the operation is carried out directly, thereby rendering the indirect process unnecessary.

MERCERIZING MACHINE.

William S. Ashworth, assignor to the Philadelphia Textile Machinery Company, of Philadelphia, Penn. No. 685,085, October 22, 1901.

By the use of this machine the inventor claims that a more brilliant lustre is obtained, and the shrinkage of the material is prevented. The novelty in the invention consists in the construction of the apparatus, by which the fibre is rotated rapidly in the bath while under tension. It is claimed that by this treatment the fiber is thoroughly penetrated by the alkaline bath, and therefore the time of the process is shortened and the result better than the one obtained by simple immersion.

DYEING MACHINE.

John H. Steadwell, assignor to Steadwell Dyeing Machine Co. No. 685,699, October 29, 1901.

This invention comprises a dyeing machine which is built for the purpose of thoroughly loosening the stock before the

dye liquor is run in. The construction is the usual cylinder form of most of the stock dyeing machines. However, it is arranged with steam pipes so that the stock is steamed first and then, while still heated from the action of the steam, the dye-liquor is admitted. It is claimed that by this method the stock will absorb the dyestuff more quickly, and the resulting colors be faster than with the ordinary ways of coloring. The claim covers the details of construction.

MERCERIZING-MACHINE.

Charles L. Weichelt, of Philadelphia, Pennsylvania. No. 685,889, dated November 5, 1901.

The claims cover:—

1. The combination in a mercerizing-machine of tanks for containing the mercerizing liquid and a neutralizing or washing liquid, an overhead track, a traveling carriage carried by said track, pulleys, carried by said carriage, frames carrying yarn-carrying rollers, a vertical guide carried by said frames and passing through said carriage, cables attached to said frames and passing over said pulleys on said carriage, a counterweight attached to the other end of said cables, means whereby said yarn-carrying rollers may be moved toward or away from one another, and means whereby said rollers may be rotated.

2. The combination with the roller-carrying frame of a mercerizing-machine, of a traveling carriage, a counterweight with a vertical perforation, ropes or chains connecting said counterweight and said roller-carrying frame, pulleys carried by said carriage over which said ropes or chains pass, and a vertical guide carried by said frame passing through the perforation in said counterweight and through a guide carried by said carriage.

DRYING APPARATUS.

Milton B. Litch, of Steelton, Pennsylvania. No. 686,096, dated November 5, 1901.

This invention relates to drying apparatus, the same being particularly designed for use in drying leaf-tobacco, yarn, fabrics, and the like.

The object of the invention is to provide novel means whereby the articles of material being dried may be moved, and thereby brought in contact with and subjected to the action of the air, and means whereby a current or blast of air may be simultaneously forced in contact therewith.

APPARATUS FOR DYEING, &c.

John C. Hamer, of Radcliffe, England. No. 687,374, dated November 26, 1901.

This invention relates to that type of apparatus for dyeing and otherwise treating fibrous material in a spun or other state wherein the material to be treated, without using perforated spindles or tubes, is packed in perforated baskets placed removably into a drum which has rotary motion imparted, and the liquor is passed through and the superfluous liquor afterward extracted from the material by the action of centrifugal force.

The object of my invention is to so construct the said type of apparatus that the liquor is more evenly distributed over the material to be treated and the necessity hitherto experienced of reversing the said baskets in the said rotary drum is dispensed with, as well as in some cases the use of the liquor-circulating pump, and the liquor is not liable to atomize. The claims cover the details of construction.

MACHINE FOR COLORING LEATHER.

Rufus D. Scott, of Danvers, Massachusetts. assignor, by mesne assignments, to Scott Leather Machine Company. No. 688,035, dated December 3, 1901.

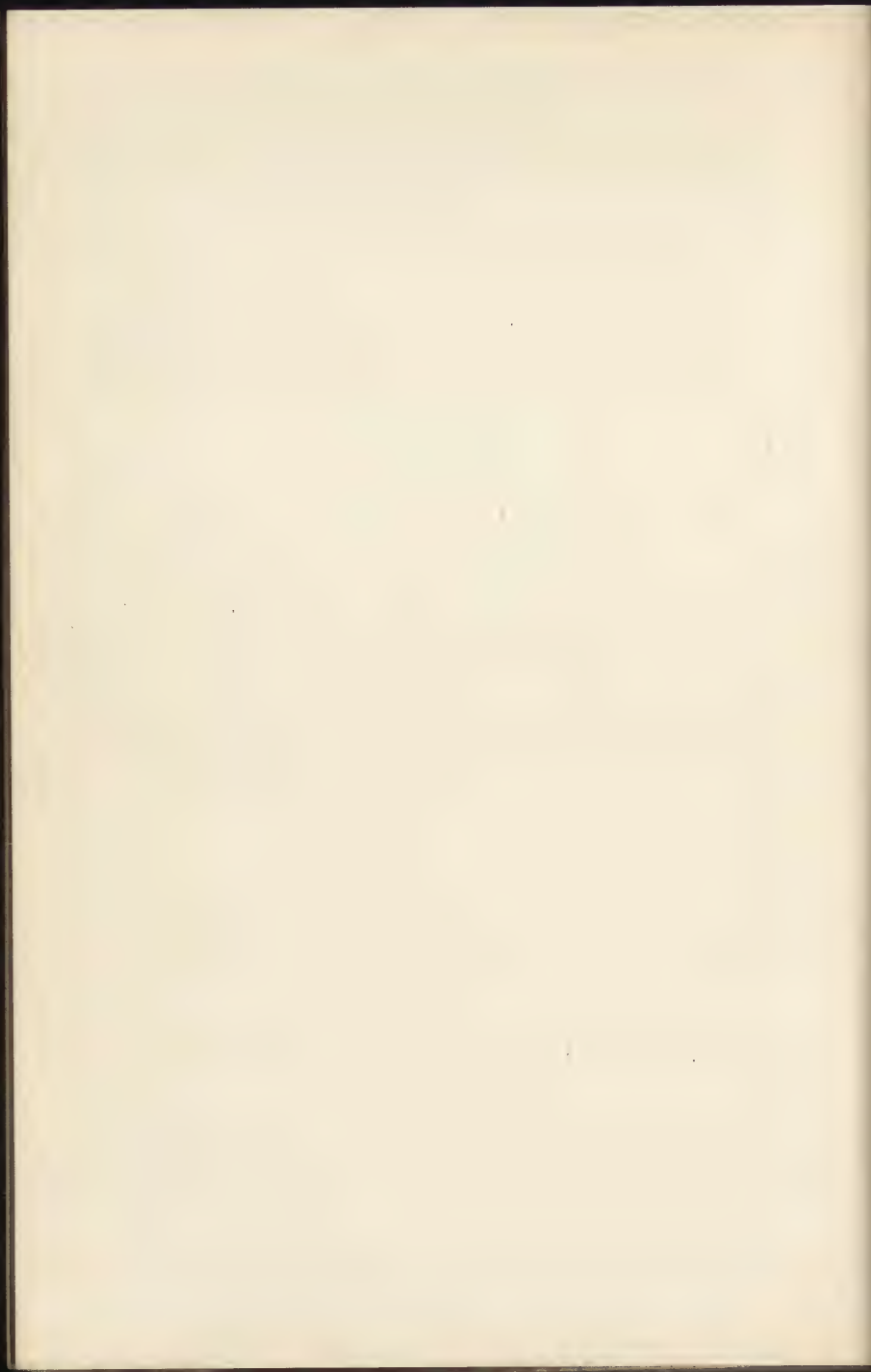
This invention relates to that class of apparatus for treating hides or skins in which the hide or skin is drawn by means

of a belt or carrier under mechanisms for seasoning, rubbing in, and stretching the skin and for spreading and finishing it during the progress of the hide or skin through the machine.

The invention relates particularly to the construction of the seasoning-rolls, to the construction of the "rubbing-in" rolls, to mechanism for the equalization of the upward pressure on the carrier under the rubbing-in rolls, to the means for providing a pump and a continuous pressure in the feed-pipe, to the drip mechanism, to the means for diverting the drip from one of the seasoning-rolls when it is lifted, and to other constructions and combinations whereby the machine is rendered more effective.



PROCESSES OF DYEING,
MORDANTING, ETC.



PROCESSES OF DYEING, MORDANTING, ETC.

PROCESS OF DYEING.

Emil Haussmann, of Berlin, Germany, assignor to the Actien-Gesellschaft fur Anilin-Fabrikation. No. 665,737, dated January 8, 1901.

The application in industry of sulfureted coloring-matters directly dyeing cotton has essentially increased during late years; but the presence of sodium sulfid employed as a solvent offers certain great inconveniences, as it is most injurious to the hands of the workmen. It prevents the use of metallic vessels, it yields waste waters containing sulfur, and it affects, moreover, the fiber to a considerable extent.

The inventor has now found that the above inconveniences may easily be avoided by simply dissolving the sulfureted coloring-matters in caustic-soda lye with the addition of certain organic substances possessing weakly-reducing properties.

The claim covers the process of dyeing and printing with sulfureted coloring-matters, which consists in dissolving these coloring-matters in caustic alkalies with the addition of glucose and then dyeing the goods with the solutions thus obtained.

PROCESS OF DYEING.

Winthrop C. Durfee, of Boston, Massachusetts. No. 666,846, dated January 29, 1901.

The claim covers:—

The improvement in the processes of dyeing and printing fibrous materials, which consists in subjecting such materials

to the action of dibasic saccharic acid ($C_6H_{10}O_8$) or its salts in connection with the mordants which are employed in the said processes.

PROCESS OF DYEING WITH BASIC DYES.

Max Becke and Hermann Bablich, of Höchst-on-the-Main, Germany, assignors to the Farbwerke, vormals Meister, Lucius & Bruening. No. 666,256, dated January 22, 1901.

The claims cover:—

1. The process for dyeing fast tannin-antimony lakes of basic polyazo dyestuffs and basic safraninazo dyestuffs on vegetable fiber, which consists in first dyeing these dyestuffs directly upon the vegetable fiber and then converting them by subsequent treatment with tannin and antimony salts into the fast tannin-antimony lakes.

2. The process of dyeing vegetable fiber by basic polyazo and safraninazo dyestuffs, which consists in first dyeing these dyestuffs in a neutral or slightly-acid bath directly upon the vegetable fiber, and then converting them by subsequent treatment with tannin and an antimony salt into the fast tannin-antimony lakes.

PROCESS OF EXTRACTING GREASE FROM WOOL.

Walter Erben, of Philadelphia, Pennsylvania. No. 669,955, dated March 12, 1901.

The claims describe:—

1. An improvement in the art of extracting grease from wool by means of volatile liquid solvent in a closed vessel, said improvement consisting in first forcing or drawing heated liquid solvent through the mass of wool, then expressing surplus solvent from the wool by mechanical pressure, then releasing the wool from such pressure, then forcing or drawing water through the wool in order to remove the remaining traces of solvent therefrom, and then expressing surplus water from the wool by mechanical pressure.

2. An improvement in the art of extracting grease from wool by means of volatile liquid solvent in a closed vessel, said improvement consisting in first forcing or drawing through the mass of wool, solvent heated to a uniform temperature then expressing surplus solvent from the wool by mechanical pressure, then releasing the wool from such pressure, then forcing or drawing water through the wool in order to remove the remaining traces of solvent therefrom, and then expressing surplus water from the wool by mechanical pressure.

3. An improvement in the art of extracting grease from wool by means of volatile liquid solvent in a closed vessel, said improvement consisting in first forcing or drawing heated liquid solvent through the mass of wool, then expressing surplus solvent from the wool by mechanical pressure, then releasing the wool from such pressure, then forcing or drawing heated water through the wool in order to remove the remaining traces of solvent therefrom, and then expressing surplus water from the wool by mechanical pressure.

4. An improvement in the art of extracting grease from wool by means of volatile liquid solvent in a closed vessel, said improvement consisting in first forcing or drawing heated liquid solvent through the mass of wool to extract the grease, then expressing surplus solvent from the wool by mechanical pressure, then releasing the wool from such pressure, then forcing or drawing heated water through the wool in order to remove the remaining trace of solvent therefrom, and then expressing surplus water from the wool by mechanical pressure applied to the bottom of the mass, and introducing water beneath the mass as it is being compressed.

PROCESS OF PRINTING AND PRODUCT THEREOF.

William-Friese-Greene, assignor to the Electrical Inkless Printing Syndicate, Limited, London, England. No. 670,510, March 26, 1901.

The inventor has discovered that if material is saturated with an oxy derivative of benzene which will reduce a haloid salt of silver be traversed by an electric current in the presence of moisture, an exact reproduction of the electric conductor in contact with this is produced. This reduction is independent of the material of which the conductor consists and the direction of the current. In practice the process is to prepare the textile fabric, etc., by saturating it with a developer of the oxy-benzene series, and then placing the prepared fabric upon a conducting medium, with a pad of moist cloth. The medium is then connected with one pole, preferably the positive of the continuous current of electricity. Then the designs to be printed, connected with the other pole of the circuit, are brought in contact with the prepared fabric. The current will pass through the prepared fabric and at once reproduce on it a black or colored reproduction of the design in contact. A variety of colors can be produced by means of this process. The colors vary according to the substance with which the fabric is prepared.

PROCESS OF SOFTENING WOOL.

Jules Auguste Joseph Florin and Henri Louis Lagache, of Roubaix, France. No. 671,760, dated April 9, 1901.

This invention relates to softening wool after it has been treated with chlorine or similar reagent. The wool, previously moistened in a bath of water acidulated with sulfuric acid, is put in a bath containing chlorid of lime. When the wool is removed from this bath, it is treated according to our method, which will now be described. After rinsing the wool or wool fabric is put in a vessel containing an aqueous solution of sodium carbonate of sufficient strength to neutralize any free acid yet remaining in the wool, where it remains until there is no acid reaction. Then it is removed and wrung out or the liquid drained therefrom. The wool after being taken out of the neutralizing-bath is put into the softening-bath. This bath may be made by dissolving in water a salt of a tetravalent

metal in which the metallic hydrate is feebly held. The trivalent metals, as is known, are aluminium, iron, chromium, and tin. The salts of these metals, which readily give up their hydrates, may be divided into three classes. The first class includes the basic mineral salts—as basic alum, for example. The second class includes the organic salts, such as the acetates, oxalates, tartrates, sulfocyanates, &c. The third class includes the combinations of the hydrates of these metals with potash or caustic soda—as sodium aluminate, for example.

The bath may be made with any one of the above salts—as aluminium acetate, for example—and fifty liters of the aluminium acetate at 12° Baumé may be mixed with one thousand liters of water to form the bath. If another salt of those specified be employed, a corresponding amount in weight will be used. The wool, either in fiber or fabric, is allowed to steep in this bath for about one hour. It is then removed, rinsed, and dried in the open air.

The softening-bath is not exhausted by use, and it may be used continuously by merely adding a little of the salt to maintain it at the proper strength. By heating the bath the action will be accelerated.

The wool or woollen fabric from the softening-bath will still be harsh to the touch at first; but it loses this harshness in time, and after drying it will be found soft and supple.

The neutralizing of the acid in the halo-generated wool can be effected either before or after the softening treatment. The order of these steps is not very important.

BLEACHING FABRICS.

Charles F. Cross, of London, England, and George A. Parkes of Muckmore, Ireland. No. 674,759, dated May 21, 1901.

This invention relates to the bleaching of vegetable textile materials, chiefly those made of cotton and flax, and to those steps of the entire bleaching process in which the materials are treated with alkaline reagents at more or less elevated temperature.

The immediate object of the present invention is to provide means for safely carrying out a drastic alkaline treatment under the condition of reducing to a minimum the proportion of alkaline lye to the material treated.

It is well known that in ordinary boiling in vomiting-keirs the proportion of liquor to goods is from seven to ten to one. In keirs with forced circulation it has been possible to reduce this to about one-half the above proportion. In the improved method the proportion is so far reduced that the process becomes one of steaming (in contact with the active solution) rather than boiling, and the circulation of the solution is consequently dispensed with.

The claim is for:—

The method of bleaching vegetable fabrics, which consists in saturating them at the full width with a mixture of soap, silicate, caustic soda, oil and water, and then exposing them thus saturated to the action of steam.

PROCESS OF MERCERIZING.

Fernand Gros and Paul Bourcart, of Remiremont, France.
No. 677,450, dated July 2, 1901.

The process which accomplishes the object of the present invention consists in mercerizing the cotton at one of the stages in the preparation of the cotton fiber or construction of the thread preparatory to the actual spinning operation in order to obtain mercerized cotton spinning material which may subsequently be finished as ordinary spinning material, according to the stage at which the preparation was arrested and the mercerization begun, or, on the other hand, it may be restored to any of its more primitive states or even converted into cotton-wool. For example, supposing the preparation of the spinning material is arrested on the completion of the "drawing" operation, then after the mercerization the sliver may be subjected to "slubbing" either once or twice, "roving," "spinning," and "doubling" to produce a thread of any thickness or size desired.

The claim describes the process for imparting to cotton the glossy appearance of silk, characterized by first twisting the unspun material when in the state of a sliver into a "cord" of just sufficient strength to withstand mercerization, then stretching such cord taut, then submitting it to the mercerization process, after which the cord is untwisted or restored to the state in which it was prior to such treatment.

PROCESS OF DYEING WITH SULFUR DYES.

Max Becke and Albert Bril, of Hoechst-on-the-Main, Germany, assignors to the Farbwerke, vorm. Meister, Lucius & Bruening. No. 680,472, dated August 13, 1901.

The claim covers: The process of dyeing with sulfur dyestuffs which consists in transforming the dyestuffs into their leuco compounds by reduction, dyeing with them and developing the color by oxidation. It is advantageous if the oxidation is carried out by the aid of metallic salts.

PROCESS OF MAKING INDIGO FROM INDIGO-LEUCO COMPOUNDS.

Armand Julius Stiegelmann, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik, of same place. No. 680,894, dated August 20, 1901.

The inventor has found that sulfur enters readily into reactions with indigo-leuco compounds, such as indoxyl, indoxyllic acid, and indigo-white. The reaction consists, apparently, in a combination of the sulfur with hydrogen of the leuco compounds whereby sulfureted hydrogen is formed. In any case the indigo-leuco compound is converted into indigo. The said reaction can be effected in the presence or in the absence of textile fiber. If textile material suitably prepared with sulfur be introduced into an indigo-vat, the conversion of the indigo-white to indigo-blue takes place at once in the vat during the dyeing process. Animal and vegetable fiber

have the property of fixing sulfur mechanically. If material that has been suitably prepared with sulfur be dyed in an indigo-vat, the presence of the sulfur causes the indigo to be taken up by the fiber essentially faster than if no sulfur be present, and the formation of indigo takes place already within the vat. Thus woolen material suitably prepared with sulfur upon dyeing in the indigo-vat in a short time and while immersed in the vat assumes an indigo-blue color, and in one passage through the vat is dyed approximately as strongly and as fast as unprepared wool would be dyed by three passages through the same vat.

The new process of dyeing can be carried out by using an indigo-vat that is kept alkaline by means of lime, magnesia, or other alkaline earth, and it is applicable to cotton and to woolen goods.

A special application of the new process of great technical importance consists in preparing or impregnating woolen or cotton material in some parts with sulfur while leaving the other parts free from sulfur. Upon dyeing such material in the vat the parts prepared with sulfur assume a darker shade than the others. In this way a pattern in light and dark blue can be prepared in a simple manner, while hitherto such effects could only be achieved by means of a complicated process. The herein described process can only be advantageously applied when printing indigo shades. For instance when printing with indophor (indoxyllic acid) the process prior to this invention consisted in printing this body onto the material and then passing the material through a bath containing an oxidizing agent, such as ferric chlorid. According to the present invention a mixture of indophor and sulfur is printed on the goods, and then upon steaming the indigo-blue is directly formed upon the fiber.

Instead of preparing material with sulfur itself mixtures producing sulfur, such as sulfid of sodium or sulfid of calcium, with acids, can be employed.

PROCESS OF EXTRACTING WOOL FAT.

Harriet F. Cutter, of East Lyme, Connecticut, executrix of Frederick W. Robinson, deceased. No. 680,963, dated August 20, 1901.

The claims cover:—

1. The process of treating wool for the removal of grease and naphtha which consists in subjecting the wool in a tank under heat to vacuum action applied successively or alternately at different points and then admitting pulsations of dry steam to drive out the naphtha.

2. The process of treating wool which consists in removing the natural grease in large parts by baths of naphtha; then boiling the wool in naphtha in a vacuum; then subjecting the wool to vacuum action applied successively or alternately at different points, and then under heat and in a vacuum subjecting the wool to comparatively dry steam.

PROCESS OF DYEING THIOSULFATE COLORS.

Arthur George Green, of Heaton Moor, and Alexander Meyenberg, of Manchester, England, assignors to the Clayton Aniline Company, Limited, of Clayton, Manchester, England. No. 681,117, dated August 20, 1901.

The claims cover:—

1. The new and improved process of dyeing, such process consisting in first rendering soluble thiosulfate colors free from sulfids, polysulfids or free sulfur, then affecting the dyeing by converting the coloring-matter, by solution in aqueous neutral sodium sulfite, into its soluble sulfite compound, and reducing the latter in the dye-bath by means of an alkaline reducing agent.

2. The new and improved process of dyeing, such process consisting in first rendering a thiosulfate color soluble by means of sodium sulfite, then effecting the dyeing by conversion of the coloring-matter, by solution in aqueous neutral sodium sulfite, into its soluble sulfite compound and reducing the latter in the dye-bath by means of glucose and an alkali.

PROCESS OF DYEING.

René Bohn, of Mannheim, Germany, assignor to Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 681,613, dated August 27, 1901.

It is known that naphthazarin, a body which has long been used as a dyestuff, yields on reduction a compound which is considered to be tetrahydroxy-naphthalene. This body has up to the present not been used or looked upon as a dyestuff, nor has it received any industrial application. I have discovered that it is eminently suited for use as a dyestuff in that it dyes animal fiber directly and combines with metallic mordants, such as alumina or chrome, producing shades which on suitable treatment can be converted into black-lakes of great intensity and fastness. The shade produced on unmordanted wool, for example, is brown, while cotton mordanted with alumina is dyed a yellowish shade, which becomes darker on exposure to air. The dyeings produced on unmordanted material become darker when treated with a suitable oxidizing agent, and if chromates, which are especially suitable, be employed a fast black-lake is formed. The dyestuff on mordanted material is converted into a black metallic lake when treated with bichromate of potash or another suitable oxidizer, which need not contain a chemically-combined metal—for instance, air. The solubility of tetrahydroxy-naphthalene in water is such that the dyeings produced by its aid are of great evenness. At the same time they possess great intensity. The dyeings produced by a given weight of tetrahydroxy-naphthalene and subsequent treatment with chromates are approximately twice as intense as the dyeings produced by the same weight of alizarin-black.

The claims specifically cover the process for producing dyeings by means of tetrahydroxy-naphthalene.

PROCESS OF DYEING.

Pierre Mercier and Marc Chaumartin, of Lyons, France. No. 684,840, dated October 22, 1901.

The object of our invention is a process for the obtaining of double shades on silk cloths, whether pure or a union.

This process consists, first, in first preparing the silk in skeins or the floss-silk that is to be used either as warp or as woof of the cloth by submitting it through any known process to the operations of scouring, galling, clearing, passing the bichlorid of tin, fixing, and washing; second, in weaving a cloth with the warp or woof thus prepared and a warp or woof of raw silk that has not been prepared; third, in passing the cloth thus obtained through several baths of successive dyes, the dyestuffs of which, duly chosen, will fix on one of the parts (either the warp or the woof) and not on the other, for the preparation to which one of these parts has been submitted acts as a mordant with some dyestuffs and as a reserve with others. One can therefore choose for one of the baths a dyestuff which will fix on the prepared part and not on the raw one, and for the other bath a dyestuff which will fix on the raw part without affecting the prepared part in a perceptible manner.

The process described consisting of subjecting, before weaving one of the components, either the warp or woof to tannin and bichlorid of tin, serving as mordant for basic dyes and as reserve for acid dyes, then weaving said component with the other unprepared component, and then passing the fabric through several baths of successive dyes, the acid dye on which the preparation acts as resist fixing on the unprepared material, and the basic dye on which the preparation acts as mordant, fixing on the prepared material.

PROCESS OF DYEING ON THE FIBER.

Bernhard Heymann, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Company of New York, N. Y. No. 688,999, dated December 17, 1901.

The inventor has found that the so-called "sulfurized" substantive coloring-matters, which are obtained by treating different aromatic compounds with sulfur and sulfids or poly-

sulfids of alkalies or the like, can be transformed into alkylated or aliphylated substitution products when they are treated with alkylating agents.

The process is especially valuable for dyeing purposes. The materials dyed with sulfurized dyestuffs are subsequently treated on the fiber with alkylating agents. For this alkylating process such materials can be used which are directly dyed with sulfurized dyestuffs, or goods which after dyeing with these sulfurized dyestuffs are further oxidized on the fiber either by exposing them to the air while still wet or by treating them with potassium bichromate or the like. The process of alkylation is carried out by handling the dyed goods for some time in a bath containing the alkylating agents. It is advisable to add to the bath bodies with alkaline reaction, such as caustic-soda lye, sodium sulfid. or the like. By these means the tints are in most cases essentially changed and fastness to boiling is increased. Such alkylating agents can be used as react in a neutral or an alkaline solution or suspension—as, for instance, ethyl bromid, benzyl chlorid, dimethyl sulfate, or the like. As the employment of these substances entails great inconveniences in dyeing on account of their volatility and small solubility in water, it is of great advantage to employ the same in the shape of their ammonium compounds, which are soluble in water and not volatile. The alkylation by means of these compounds takes place with a splitting off of the tertiary base. Thus, for instance, on employing phenyldimethylbenzylammonium chlorid the same result is obtained as by means of benzyl chlorid, the tertiary base being split off during the process. Phenyldimethylbenzylammonium chlorid, which can be obtained by the action of benzyl chlorid on dimethylanilin, has proved to be particularly valuable for this process, because it reacts with the greatest ease on the dyed goods. Chloroacetamid can also be employed with advantage as alkylating agent. It reacts also with great facility and is also easily soluble in hot water.

PROCESS OF DYEING.

Heinrich Laag, Charles Ruetler and Martin Ruetler, of Dusseldorf, Germany. No. 688,742, dated December 10, 1901.

By this invention is devised a simple process in order to overcome the inconvenience incident to the ordinary jigger dyeing process and to employ the latter with good results for dyeing fabrics, even fabrics of threads, which take up the dye very rapidly. It is found that this can be done by moving the fabric through the jigger with increasing velocity while introducing a previously-prepared dye-bath into the box of the said jigger in such a manner that the latter is gradually filled, not before, but during the moving of the fabric through this vat. Furthermore, not only the gradual filling of the jigger with the dyebath during the movement (with increasing velocity) of the fabric through the box, but it also must be with a dye-bath which possesses such composition and such a strength that a given area of the fabric to be dyed receives the desired color and shade directly by means of a given volume of the said dye-bath, thereby exhausting this volume of its dyeing power.

The subject-matter of the present invention consists, therefore, in a process of dyeing fabrics by previously preparing the dye-bath in a quantity, composition, and strength adapted as such to produce the desired shade of the intended chloration on the whole area of the said fabric, thereby practically exhausting this dye-bath, and then running the fabric through the vat of a suitable dyeing-machine with increasing velocity and during this traversing gradually introducing, practically without interruption, this whole bath into the box of the jigger, in such a manner that this box is gradually filled with the dye-bath during the traversing of the fabric and by passing the fabric through the vat until the dye-bath in the jigger is sufficiently exhausted, whereby the fabric receives the desired shade.

PROCESS OF MAKING MULTICOLORED FABRICS.

Felix Meyer, of Aix-La-Chapelle, Germany. No. 689,559, dated December 24, 1901.

While up to now mixtures were made by mixing woolen fibers of different shades, each of which had to be dyed first, and while multicolored twists were fabricated by twisting threads of different shades, which had also to be dyed first, the new and simplified way of making those yarns and fabrics which contain such yarns is as follows: Woolen fiber, either wool or tops or noils or any other kind of woolen material, is prepared or mordanted, for example, by fixing chromic acid on the fiber or by any other mordanting or preparing process. Now the prepared woolen fiber is mixed with unprepared fiber or with fiber prepared in any other way, and then they are spun together. For making multicolored twist the prepared or mordanted thread is twisted with unprepared thread or with threads prepared in another way. It is advisable to give the prepared or mordanted wool or thread a light red or blue shade in order to have a better control over the mixing or twisting process.

The yarn made in the above-described way is either dyed in the yarn in hanks or skeins or it is woven and then dyed in the piece. In either case the yarn or cloth is dyed thus: that the prepared fiber is colored a shade different from that of the unprepared fiber, as well as from that of the fiber prepared in another way, so an effect of two or more shades, according to the number of kinds of prepared fibers and unprepared fibers, is made by dyeing the aforesaid mixtures or twists in hanks or in the piece. The dyeing is done with a combination of coloring-stuffs which either have no effect on unprepared fibers or have a different effect on prepared fibers and on unprepared ones or which dye both classes of fibers in the same way.

RED CARBON DYE LAKE.

Paul Julius, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 690,294, dated February 31, 1901.

This invention relates to the manufacture of coloring-matter lakes from certain monoazo dyestuffs which can be derived from a diazotized heteronuclear monosulfo-acid of beta-naphthylamin and a suitable component. It has been found that of these azo dyestuffs those which contain beta-naphthol as a component are in particular suited to the production of lakes containing calcium, barium, aluminium, lead, zinc, &c., or several of these metals. These lakes are applicable in the arts for use in the manufacture of lithographic and of printing inks, for the production of oil-paints, colored paper, &c. These beta-naphthol azo dyes all have in common the property of yielding lakes containing calcium, which in addition to being insoluble in water are likewise quite fast to ordinary acids and to light, and it is this combination of properties which distinguishes these lakes and promises to make them desirable and useful in the arts.

These are the coloring-matter lakes which contain one or more of the following mono-azo dyestuffs: (a) 2-naphthylamin-5-sulfo-acid-azo-beta-naphthol, (b) 2-naphthylamin-8-sulfo-acid-azo-beta-naphthol, (c) 2-naphthylamin-7-sulfo-acid-azo-beta-naphthol. (d) 2-naphthylamin-6-sulfo-acid-azo-beta-naphthol, and of these lakes more particularly those lakes which contain calcium.

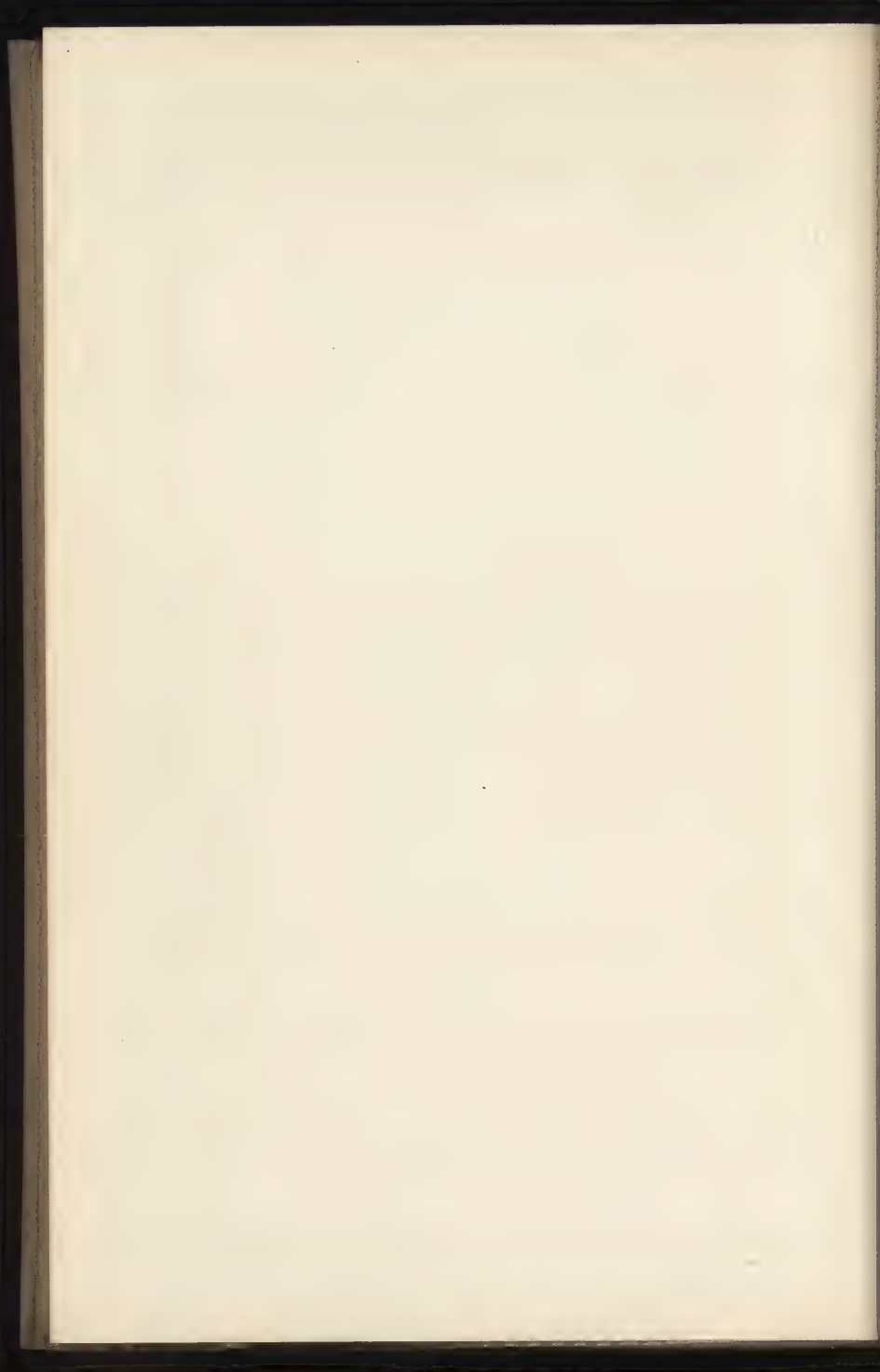
PROCESS OF DISCHARGING INDIGO-DYED WOOL.

Wilhelm Berns, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 690,347, dated December 31, 1901.

The processes for producing white or colored discharge effects on indigo-dyed wool at present known are more or less unsatisfactory. For instance, by attempting to apply to wool

the chromate discharge process as used for indigo-dyed cotton it is found impossible to obtain even impure whites, as hardly any destruction of the indigo on the parts printed is effected, and the colored effects obtained by this method are on this account insufficiently brilliant. The inventor has found that by the addition of certain operations to the discharging process exceedingly pure white and colored discharge effects on indigo-dyed wool can be produced; and the invention consists in the addition of these to and in the combination of these with the known discharging process. These additions are, first, steaming the goods after having printed them with a discharging composition, and, second, treating the goods with a bleaching agent—such a sulfurous acid, hydrogen. peroxid, potassium percarbonate, and the like after having discharged them.

MISCELLANEOUS.



MISCELLANEOUS.

METHOD OF MAKING POTASSIUM HYDROXID.

Heinrich Precht, of Neustassfurt, Germany. No. 665,617, dated January 8, 1901.

The claims are for:—

1. The process which consists in evaporating a solution containing about fifty per cent. of potassium hydrate and about half a per cent. of potassium chlorid, allowing the crystals to separate out at about 60° centigrade and removing the crystals.

2. The process which consists in evaporating a solution containing about fifty per cent. of potassium hydrate and about half a per cent. of potassium chlorid, crystallizing out the hydrate at about 60° centigrade, and removing the crystals from the mother-liquor at a temperature not less than 35° centigrade.

3. The process which consists in evaporating a solution of potassium hydrate and potassium chlorid, separating the latter at a temperature of from about 15° to 20° centigrade, evaporating the remaining solution, stirring and cooling the same to about 60° centigrade, and removing the crystals formed at a temperature not less than 35° centigrade.

PROCESS OF INCREASING STABILITY OF NITROCELLULOSE.

Alfred Luck, of Dartford, and Charles F. Cross, of London, England. No. 665,792, dated January 8, 1901.

This invention, which was originally disclosed in our Pa-

tent No. 647,420, granted April 10, 1900, relates to a process for rendering cellulose nitrates stable by treating them with solutions of lead or zinc salts, such as nitrate or acetate of lead and the acetate or chlorid of zinc.

This process as applied to nitrocellulose or guncotton which has been purified as much as possible in the usual way by long-continued boiling and washing is as follows: At the completion of this ordinary purification process in the usual course of manufacture the guncotton is in the form of fibrous particles freely suspended in water. This excess of water is then in the ordinary course of manufacture removed by means of a centrifugal machine containing a cloth or gauze, which allows the water to escape and holds back the guncotton.

In carrying out our process we prefer simply to add about one per cent. of a soluble salt, calculated on the weight of guncotton to the vessel holding the guncotton and water before it passes into the centrifugal machine. The whole mass is then boiled for about a half an hour or more at 80° to 100° centigrade, the guncotton is allowed to settle, and the supernatant liquid portion containing the salt is run off. Fresh cold water is run into the vessel and is well mixed with the guncotton. The mixture is again allowed to settle and the supernatant liquid is again removed. The washing is repeated several times for the purpose of removing all of the soluble salt. The guncotton is then separated in the form of the usual pulp (containing about thirty per cent. water) by means of the ordinary centrifugal machine, and the stabilizing operation is complete.

PROCESS OF MAKING PICRIC ACID.

Max Neumann, of Wittenberg, Germany, assignor to Westfälich-anhaltische Sprengstoff-Aktiengesellschaft, of Berlin, Germany. No. 666,627, dated January 22, 1901.

The claims cover:—

1. The process of producing picric acid from anilin, which consists in converting anilin into sulfanilic acid by treating

with fuming sulfuric acid, diazotizing the sulfanilic acid by the action of nitrous acid and finally treating the obtained diazobenzenesulfonic acid with nitric acid.

2. The process of producing picric acid from sulfanilic acid which consists in treating it with nitrous acid and then treating the diazobenzenesulfonic acid thus obtained with nitric acid.

3. The process of producing picric acid from diazobenzenesulfonic acid, which consists in treating it with nitric acid.

AROMATIC AMIDO-ALDEHYDE AND PROCESS OF MAKING SAME.

Lorenz Ach, of Mannheim, Germany, assignor to C. F. Boehringer & Soehne, of Waldhof, Germany. No. 667,382, dated February 5, 1901.

This invention relates to the preparation of amido-aldehydes, and in particular the amido-aldehydes which are derivatives of aromatic series.

The present application, is designed to cover specifically the preparation of the aromatic amido-aldehydes from the acids of Pellizari—i. e., the acids obtained from the addition of alloxan and aromatic bases, as above stated. Thus, for example, para-dimethyl-amido-benzaldehyde may be obtained if the acid obtained from the product of addition of dimethylanilin and alloxan—namely, dimethyl-anilalloxan ($C_{12}H_{13}N_3O_4$) described in Gazette Chimica Italiana, Vol. 17, page 417, and whose formula is $C_{11}H_{12}N_2O_3$,—be heated with sulfuric acid. Under this process the amido-aldehydes are first obtained in sulfuric-acid solution from the free aldehydes, and may be readily separated by neutralization and subsequent extraction with ether or the like. This new process leads not only to the primary, but also to the secondary and tertiary amido-aldehydes, and is susceptible of a very wide, extensive, and general application. It has accomplished this object when used in connection with all the benzene derivatives thus far treated. By varying the degree of concentration, the tempera-

ture, and proportions of the sulfuric acid in accordance with the nature of the starting material employed the correct conditions for obtaining the amido-aldehydes in the most advantageous and economical manner are readily established.

PROCESS OF MAKING TUNGSTATES.

George T. Holloway and Harry W. Lake, of London, England. No. 667,705, dated February 12, 1901.

This invention relates to the preparation of tungstate of sodium or tungstate of potassium. The process consists in forming sodium or potassium tungstate by fusion of an ore of tungsten with a silicious flux, to which is added or which is combined with or contains a salt of oxid of sodium or potassium, the silicious flux being in the bath in excess of the quantity required to combine with all the iron and manganese contained in the one under treatment, so that pure tungstate of soda may be produced, which will not require further purification.

PROCESS OF PRODUCING CHLORIDS OF AROMATIC SULFONIC ACIDS.

Augustus Bischler, of Basle, Switzerland, assignor to Basle Chemical Works. No. 667,861, dated February 12, 1901.

The inventor has found that the chlorids of the aromatic sulfonic acids may be obtained with ease and in a pure state by means of the aromatic sulfinic acids by treating these sulfinic acids as such or their salts with chlorin.

Among the aromatic sulfinic acids the orthotoluenesulfinic acid, as well as the ethereal salts of the orthosulfinicbenzoic acid, is specially important for the preparation of the chlorids, by means of which the pure saccharin is directly obtained.

NICKEL SALT AND PROCESS OF MAKING SAME.

Hans A. Frasch, of Hamilton, Canada. No. 669,899, dated March 12, 1901.

The object of this invention is the production of a nickel salt which may be employed directly for nickel-plating and for other purposes.

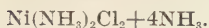
The inventor finds that a salt of nickel and ammonium in certain proportions is nearly insoluble in a concentrated salt solution and that the nickel-ammonium salt, while readily soluble in water, can be precipitated from an aqueous solution by the addition of another soluble salt, such as sodium chlorid or potassium chlorid or sulfate or any other soluble salt which will not combine with or contaminate the nickel-ammonium salt.

In carrying out this invention the ammonia-gas is absorbed in a solution of a nickel salt, such as the sulfate or chlorid, until all the nickel and other metals in the solution which are capable of combining with ammonia are transformed into the corresponding ammonium salt, leaving a slight excess of ammonia, or a mixture of metallic salts containing nickel may be exposed in a dry state to the action of ammonia or ammonium carbonate until the salts are converted into the ammonium salts, and these last may then be dissolved in water, and to this sodium chlorid until at a certain saturation of the solution with sodium chlorid a nickel-ammonium salt containing approximately six equivalents of ammonia to every one of nickel is precipitated, the addition of sodium chlorid being continued until precipitation ceases. Of these six equivalents of ammonia two are in chemical combination with the nickel and chlorin and four exist as free ammonia. Instead of sodium chlorid potassium chlorid may be used, or any other salt which will displace the nickel-ammonium salt. Furthermore, instead of treating the metallic salts or a solution thereof with ammonia-gas ammoniacal solution may be used, in which case the metallic-salt solution may be saturated with sodium chlorid or other suitable salt, to which is added a solution of ammonia of 26° Baumé in strength, which latter solution may

be previously saturated with sodium chlorid or other salt in sufficient quantity to precipitate the nickel salt.

The salt is a purple-violet colored crystalline, very hygroscopic, and if precipitated in a concentrated salt solution it forms a fine powder of minute crystals; while if dissolved to saturation in hot water, large crystals are formed upon cooling, which are quadratic in form, and of dark blue or sapphire color. If exposed to dry air, part of the ammonia evaporates and the color changes from purple to green. If exposed to moist air, it absorbs the moisture and liquifies, forming a dark green solution. It is readily soluble in water, forming a blue solution, and parts with some of its ammonia. If exposed to atmospheric air or if part of its ammonia has been allowed to evaporate, it forms a turbid solution which becomes clear upon the addition of ammonia. If boiled in aqueous solution, two-thirds of the ammonia contents evaporate and a green precipitate is formed. The dry salt smells slightly of ammonia and if moistened or dissolved develops a strong odor of ammonia. It differs from the normal nickel-ammonium chlorid or sulfate in the great excess of ammonia it contains, there being about six equivalents of ammonia to every one of nickel, two of said equivalents of ammonia being in chemical combination with the nickel and chlorin and four existing as free ammonia.

The constitution is represented by the formula:



WATERPROOF CASEIN AND METHOD OF PRODUCING SAME.

Albrecht Schmidt, of Berlin, Germany, assignor, by mesne assignments, to Chemische Fabrik Auf Actien (vorm. E. Schering). No. 670,689, dated March 26, 1901.

When a solution of soda casein of about five per cent. strength is mixed with formaldehyd. no coagulation takes place. The solution remains for a long time clear and fluid.

When this solution is poured upon a plate or other support or backing and allowed to dry, a transparent film or layer of casein is formed, which is completely insoluble in water.

Films of casein treated with formaldehyd and films not so treated are easily distinguished by the following test: The film is carefully removed from the backing and soaked in water, to which a few drops of methylene-blue are added. Upon warming the samples carefully a light-blue color appears in the samples not treated with formaldehyd, while a deep-blue color appears in the samples which have been rendered waterproof by this treatment. An ammonia-casein solution acts in a similar manner; but in this case a thickening or precipitation takes place when large quantities of formaldehyd are added. When the added quantity of formaldehyd is small, the solution remains clear, and the film formed by the evaporation or drying of this clear solution upon a backing or support is waterproof.

PROCESS OF PRODUCING ACETYLSALICYLIC ACID.

Leonhard Lederer, of Sulzbach, Germany. No. 671,769, dated April 9, 1901.

This invention relates to a new process of producing these substances, according to which the introduction of the acetyl group into the hydroxyl of salicylic acid can be accomplished without use of heat, the reaction being performed for this purpose in the presence of a condensing agent, for example, concentrated sulphuric acid. In this way the acetylation of the salicylic acid, as well as of its derivatives, is easily and successfully accomplished.

PROCESS OF PREPARING SOLUTIONS OF CELLULOSE FOR THE MANUFACTURE OF THREAD.

Emil Bronnert, of Dornach, and Max Fremery and Johann Urban, of Dremmen, Germany. No. 672,350, dated April 16, 1901.

Besides ammoniacal solutions of cupric hydroxid similar solutions of other cupric salts dissolve cellulose, as is known. Hitherto, however, solutions of cellulose in ammoniacal cupric hydroxid solutions have alone been used for making artificial silk-like threads. By the present invention there is prepared a solution of cellulose in an ammoniacal solution of cupric carbonate, which by manufacture of artificial thread. For this purpose an aqueous solution containing sixteen to eighteen per cent. of ammonia is saturated in the cold—that is, at a temperature between -5° centigrade and $+5^{\circ}$ centigrade—with cupric carbonate and the cellulose is dissolved in this liquid. Such a solution of cupric carbonate contains more of this salt than does one prepared at a higher temperature. The dissolution of the cellulose in the cupric-carbonate solution is also preferably effected within the limits of temperature above named, as it is then more rapid. Moreover, it is advantageous to keep the prepared solution at a low temperature—say between 0° centigrade and 10° centigrade—up to the moment when it is to be manufactured into thread, as in this manner any decomposition of the cellulose which might diminish the ease with which the solution can be manufactured into threads and the strength of the finished thread is absolutely avoided.

Solutions of cellulose prepared according to this invention have the advantage that they may contain more copper than corresponds with the equimolecular proportion of copper salt to cellulose, which is preferable when cupric hydroxid is employed. Furthermore, since salts of copper, like cupric carbonate, have no oxidizing action on cellulose solutions of the latter in ammoniacal cupric carbonate are more stable than solutions of cellulose in ammoniacal cupric hydroxid. Thus even after a long time neither is the ammonia oxidized to nitrous acid nor the cellulose to oxycellulose.

PROCESS OF MAKING NITRO AND CHLOR BENZALDEHYDE.

Julius Oppermann and August Fette, of Biebrich, Germany, assignors to Kalle & Co. No. 673,887, dated May 14, 1901.

As starting material for the manufacture of ortho-nitro-benzaldehyde, which, as it is known, serves for the production of the artificial indigo, hitherto the pure ortho-nitro-benzylchlorid was used by converting the same into the nitro-benzaldehyde. The only process which has hitherto been technically carried out for the production of ortho-nitro-benzylchlorid consisted in the nitration of benzylchlorid and separation of the thereby formed isomers.

The inventors have now found a process which, starting from the cheap ortho-nitro-toluol, permits of producing the ortho-nitro-benzaldehyde in any quantities.

If ortho-nitro-toluol is chlorinated at an elevated temperature, it is possible to convert a part of the same into ortho-nitro-benzylchlorid. At the same time other chlorinated products are formed, while the rest remains as unchanged nitro-toluol. It is, however, a matter of extreme difficulty, attended with very great losses, to isolate from this reaction product the pure ortho-nitro-benzylchlorid.

If, however, the chlorinated oil liberated from acid by washing with alkaline water is heated with salts of certain inorganic or organic acids in alcoholic solution or in a suspension in water or other suitable liquids, the ortho-nitro-benzylchlorid is transformed into compounds having the nature of ethers, which afterward on cooling or after previously distilling off the alcohol separate out mostly in solid crystalline form. The unchanged ortho-nitro-toluol can now be eliminated from the ortho-nitro-benzylether by distillation with steam or siphoned off in so far as water, soluble ethers, or the salt-like nitro-benzyl derivatives are concerned. The benzyl derivatives separated in this manner are obtained after filtering and pressing in a form, in which they can be directly oxidized to the ortho-nitro-benzaldehyde.

Of the inorganic or organic acids, the salts of which are particularly adapted for converting the nitro-benzylchlorid into ether-like compounds, we mention the following ones: Acetic acid, oxalic acid, benzoic acid, phthalic acid, thiosulfuric acid, (hyposulfurous acid,) sulfocyanic acid, acetate of soda, sodium hyposulfite, sodium sulfocyanid.

PROCESS OF MAKING PHENYGLYCIN-ORTHO-CARBOXYLIC ACID.

Benno Homolka, of Frankfort-on-the-Main, and Friedrich Hubner, of Höchst-on-the-Main, Germany, assignors to Farbwerke, vorm. Meister, Lucius & Bruening. No. 675,217, dated May 28, 1901.

This patent describes the process for the manufacture of phenylglycin-ortho-carboxylic acid which consists in heating to a high temperature a mixture of ortho-halogen-benzoic acid and glycol, both in form of their salts. The product when cold is dissolved in water. The solution is filtered, if need be, and has added to it an excess of hydrochloric acid, whereupon the phenylglycin-orthoric acid separates. This acid may be separated from any ortho-chlorobenzoic acid still present by treatment with chloroform. It is then purified by crystallization from water containing hydrochloric acid.

The phenylglycin-ortho-carboxylic acid thus obtained has the properties described by Mauthner and Snida, (Wiener Monatshefte IX, 728,) yielding when heated with caustic alkalies the known indigo reaction of Herrmann.

UREA DERIVATIVE AND PROCESS OF MAKING SAME.

Adolf Israel and Richard Kotche, of Elberfeld, Germany, assignors to the Farbenfabriken of Elberfeld Company of New York, N. Y. No. 675,627, dated June 4, 1901.

This invention relates to the production of a new urea derivative of amidonaphtholsulfonic acids. The process for producing this body consists in causing phosgene (COCl_2) and a substance adapted to absorb hydrochloric acid to act on an equimolecular mixture of beta₁-amido-alpha₂-naphthol-beta₄-sulfonic acid and of beta₁-amido-alpha₄-naphthol-beta₃-sulfonic acid. A condensation of the two above-named amidonaphtholsulfonic acids with one molecule of phosgene takes place under evolution of two molecules of hydrochloric acid, the urea derivative being thus formed. The new urea derivative

thus obtained may be employed for the manufacture of valuable azo dyestuffs.

UREA COMPOUND AND PROCESS OF MAKING SAME.

Adolf Israel and Richard Kothe, of Elberfeld, Germany, assignors to Farbenfabriken of Elberfeld Company, of New York, N. Y. No. 675,630, dated June 4, 1901.

This invention relates to the production of a new urea derivative of amidonaphthol sulfonic acids. The process for producing this body consists in causing phosgene (COCl_2) and a substance adapted to absorb hydrochloric acid to act on an equimolecular mixture of beta₁-amido-alpha₃-naphthol-beta₄-sulfonic acid and of alpha₁-amido-alpha₃-naphthol-beta₄-sulfonic acid. A condensation of the two above-named amidonaphthol sulfonic acids with one molecule of phosgene takes place under evolution of two molecules of hydrochloric acid, and with the formation of the urea compound. The new urea derivative thus obtained may be employed for the manufacture of valuable azo dyestuffs.

METHOD OF MANUFACTURING THIN BOILING-STARCH.

Chester B. Duryea, of New York, N. Y. No. 675,822, dated June 4, 1901.

This invention relates to an improvement in the method of manufacturing thin boiling starch, with the object in view of providing a high-grade quality of starch of this character in an expeditious manner.

Ordinary starches when boiled with water to prepare starch paste or solution for laundry or other use give exceedingly viscous and colloidal solutions. For some purposes, particularly for steam-laundry use, it is highly desirable to have starches of a less viscous and colloidal character. The present invention is directed to a starch of this latter character, and consists, broadly, in treating the starch-granules with acid

for the purpose of destroying, to a material extent, the viscous and colloidal character of the granules without materially destroying their integrity.

AMIDO-TARTRONIC ACID AND PROCESS OF MAKING SAME.

Fritz Ach, of Mannheim, Germany, assignor to C. F. Boehringer & Soehne, of Mannheim-Waldhof, Germany. No. 676,859, dated June 25, 1901.

This invention relates to the manufacture of tartronic-acid derivatives; and the object of the same is the production of amido-phenyl-tartronic acid and substitution products of the same, all of which have hitherto been unknown. The inventor has found a method whereby one is enabled to prepare para-amido-phenyltartronic acid $(\text{NH}_2.\text{C}_6\text{H}_4.\text{C}(\text{OH}):(\text{CO}_2\text{H})_2$ and a series of substitution products of the same.

PARA-AMIDOPHENYL-GLYOXYLIC ACID AND PROCESS OF MAKING SAME.

Fritz Ach, of Mannheim, Germany, assignor to C. F. Boehringer & Soehne, of Mannheim-Waldhof, Germany. No. 676,860, dated June 25, 1901.

This invention relates to the manufacture of amidophenyl-glyoxylic acids and in particular of para-amidophenyl-glyoxylic acid, its substitution products and homologues, all of which are comprised under the general designation of "para-amidophenyl-glyoxylic." Of these acids only one representative, para-dimethyl-amidophenyl-glyoxylic acid (described in *Berichte der Chemisch Gesellschaft*, Vol. 10, page 208,) has hitherto been known. A general method of preparation of this group of amido-ketone acids whose known representative has proved a highly active chemical reagent has not been found, and hence a satisfactory study of the properties of this interesting group has been wanting. The inventor has discovered a method as a result of which this group may be readily produced, which is a matter of great importance, since they serve

as the starting materials for the preparation of pharmacal products and dyestuffs. As a result of the experiments and researches in this direction he finds that the para-amidophenyl-tartronic acids which have been described in the application, Serial No. 731,674, filed September 25, 1899, are readily converted into the corresponding para-amidophenyl-glyoxylic acids when treated with mild oxidizing agents, carbon dioxide being split off coincidentally.

ALLOXAN-PHENOL AND PROCESS OF MAKING SAME.

Lorenz Ach, of Mannheim, Germany, assignor to C. F. Boehringer & Soehne, of Mannheim-Waldhof, Germany. No. 676,863, dated June 25, 1901.

The present invention relates to the art of forming chemical condensation products; and the particular object is to prepare condensation products from the phenols and alloxan. I have discovered that these compounds when brought together under suitable conditions will unite, and thereby form well defined condensation products. This condensation will take place in some cases when the component bodies are merely brought together in solution. The best results are obtained, however, when they are combined in the presence of suitable condensing agents. I have found in the course of my experiments that hydrochloric acid is particularly suitable as a condensing agent; but it is to be observed that the condensation may be carried out also by the aid of and in the presence of sulfuric acid, zinc chlorid, and other similarly-acting compounds. In the course of the reaction the phenol and alloxan unite molecule for molecule, and the reaction probably takes place in such a way that the ketone-carbon atom of the alloxan molecule and the benzyl nucleus are bound together, while at the same time the liberated atom of hydrogen is bound to the ketone oxygen of the alloxan.

The compounds of this new class of bodies so far as they have been investigated are all distinguished by ready crystallization. The derivatives of the benzene series are readily soluble in warm water and tolerably soluble in cold water.

They are readily taken up by alcohol. Alloxan-phenols are useful as medicine and lend themselves readily to such use in view of their solubility in water and absence of taste. They are, moreover, useful as starting products in the preparation of other products useful in the arts.

OXYTARTRONIC ACID AND PROCESS OF MAKING SAME.

Lorenz Ach, of Mannheim, Germany, assignor to C. F. Boehringer & Soehne, of Mannheim-Waldhof, Germany. No. 676,864, dated June 25, 1901.

The present invention relates to the manufacture of tartronic-acid derivatives; and the object of the same is the production of "oxyphenyltartronic acids," under which term are embraced the oxyphenyltartronic acids proper, as well as the substituting—e. g., a radical of the fatty or aromatic series in the benzene ring of the phenyl group, as will be readily understood. All of these acids have hitherto been unknown.

PROCESS OF DECORATING PLAITED FABRICS.

Victor Crépet and Casimir Joseph Dumoulin, of Lyons, France. No. 678,164, dated July 9, 1901.

The invention relates to light fabrics having straight and regular plaits which are obtained mechanically on known machines by covering the fabric with an auxiliary paper which is plaited at the same time as the fabric and maintains the plaits of the latter until they are fixed by heat or otherwise.

This invention consists in applying to the lower edge of the plaits while they are still pressed and held by the paper auxiliary a light layer of color, producing when the fabric is separated from its support stripes which are seen by transparency on the right side of the material.

PROCESS OF OBTAINING HYDROCELLULOSE.

Maximilian Carl Ludwig Althausse, of Billwarder-an-der-Bille, Germany, assignor to Fabrik Chemischer Praeparate

Von Dr. Richard Sthamer, of Hamburg, Germany. —No. 679,204, dated July 23, 1901.

1. The process of obtaining hydrocellulose which consists in reacting upon cellulose with chlorinated glacial acetic acid while being heated to a non-oxidizing temperature.

2. The process of obtaining hydrocellulose which consists in reacting upon cellulose with glacial acetic acid containing free chlorin at a temperature of from 60° to 70° centigrade, and agitating the mixture during reaction.

PROCESS OF EXTRACTING FAT FROM WOOL.

Georges Peltzer, of Verviers, Belgium. No. 679,777, dated August 6, 1901.

This invention relates to a process for removal of fatty matters from raw wools by means of carbon tetra chlorid, the use of which solvent presents great advantages over the processes at present in use.

1. It permits, in comparison with ordinary washing, an easy recovery of the product employed and of the fat extracted from the material treated.

2. It gives absolute safety, owing to its being neither inflammable nor explosive as compared with the use of naphtha, benzin, petroleum, or like products, which are dangerous in the liquid condition, and also in that of vapor by reason of the formation of an explosive mixture with air. The carbon tetra chlorid does not require the isolation of the rooms in which it is employed or any increase of insurance premium.

3. The treatment can be applied to wet wool, so that wool after it has been freed from potash can be treated at once without any preliminary or intermediate dryings, which are required when other solvents are employed and which involve labor, expense, and delay.

4. The process can be applied to small quantities of wool as economically as to large quantities.

5. When the process is adopted, wool can be treated continuously—that is to say, freed from potash and from fatty

matters and clean scoured—these successive operations being carried on without any handling of the wool, an advantage which cannot be obtained when there is treatment in closed vessels.

In employing carbon tetra chlorid as a solvent for the fatty matters contained in wool advantage is taken of the fact that the specific gravity of the solvent is considerably greater than that of water, so that while it is acting on the wool it can be quite covered by a layer of water, which prevents its evaporation.

MANUFACTURE OF FIBROUS PRODUCTS.

George R. Sherwood, of Kearney, Nebraska. No. 680,079, dated August 6, 1901.

This invention relates to the manufacture of paper-stock and other fibrous products from the stalks of Indian corn and plants having a similar structure; and its object is to produce economically from such stalks a fibrous stock especially adapted for use in the manufacture of paper and other fibrous products, also for numerous uses to which paper-stock is applied—such, for instance, as the manufacture of wheels, dishes, and other receptacles.

MANUFACTURE OF FELT.

Antenore Fusal, of Biella, Italy, assignor to Alfredo Balada, of same place. No. 680,522, dated August 13, 1901.

The claims describe:—

1. The process of rendering vegetable fiber such as kapok or ceiba capable of felting, which consists in treating the fiber first with a bath containing mercury, and then with a bath of substances capable of developing chromic acid, and in then drying the same.
2. The process of rendering vegetable fiber such as kapok or ceiba capable of felting, which consists in treating the fiber

first with a bath containing mercury, and then with a bath of substances capable of developing chromic acid to which have been added disintegrating and roughening agents, and in then drying the same.

PROCESS OF MAKING SODIUM SULFID AND LITHOPONE.

Jens P. Nihme, of Cleveland, Ohio, assignor to the Grasselli Chemical Company. No. 680,603, dated August 13, 1901.

This invention relates to an improved process for manufacturing sodium sulfid and lithopone at one operation, and has for its object the provision of a cheaper and more advantageous commercial method for preparing said products which will as well insure their purity.

The claim covers:—

The process of making sodium sulfid and lithopone, which consists in bringing together solutions of zinc sulfate, barium sulfid and sodium sulfate, in suitable proportions to precipitate lithopone and produce sodium sulfid in solution.

PROCESS OF TREATING WOOL GREASE.

John Hopkinson, of Bradford, England. No. 680,977, dated August 20, 1901.

This invention is applicable to the brown grease which is obtained from the washing or the back-washing of wool by treating the soapsuds with acid or to the grease obtained direct from wool by solvents or, in fact, to almost any other greases containing unsaponifiable matter.

The claims describe:—

1. The process of treating wool-grease and other like greases containing unsaponifiable matter, which consists in subjecting the grease to the action of caustic-alkali solution, thereby partially saponifying, adding salt, skimming off the raw lanolin, adding ethyl or methyl alcohol and a solvent of

fat alcohols insoluble in aqueous solution of ethyl or methyl alcohol, allowing the mixture to subside into two layers and distilling each layer separately whereby the solvents are distilled off and fat alcohols are obtained from the one and soap-stuff from the other, which latter can be finished into a valuable soap in the ordinary manner.

2. The process of treating wool-grease and other like greases containing unsaponifiable matter, which consists in subjecting the grease to the action of caustic alkali, ethyl or methyl alcohol, and a solvent of fat alcohols insoluble in alcohol, and allowing the mixture to separate into two layers, distilling off the solvents from each layer whereby a mixture of raw lanolin and fat alcohols admirable as a lubricant is obtained in one case and a soap-stuff in the other.

3. The process of treating wool-grease and other like greases containing unsaponifiable matter, which consists in partially saponifying with caustic alkali and heat, adding spirits and coal-tar benzol whereby it is divided into two layers on standing, separating these two layers and distilling off the solvents, whereby the fatty alcohols and a good soap-stuff are separately obtained.

DETERGENT COMPOSITION.

Arthur Y. Hubbell, of Newdorf, New York, assignor to the Hubbell Manufacturing Co., of New York, N. Y. No. 681,324, dated August 27, 1901.

This composition consists of the following ingredients, combined in the proportions stated: soap, one hundred pounds; powdered silica, one hundred and fifty pounds; curled horse-hair, six pounds. These ingredients are to be thoroughly mixed by agitation, so as to be uniform throughout, by first reducing the soap to a liquid form and then adding the silica. When thoroughly mixed, add thereto the hair in small quantities until the hair shall have been evenly incorporated throughout the entire mixture. When the compound shall

have become sufficiently cooled and hardened to a degree that will enable it to retain its shape, it may then be pressed into any desired shape in the usual way.

CASEIN POWDER.

John A. Just, of Syracuse, New York. No. 682,549, dated September 10, 1901.

The object of this invention is to produce a casein product which is very light and perfectly soluble in water and which has other desirable properties.

The inventor has discovered that by drying a casein solution in a thin film at a temperature which is sufficiently high to cause an almost instantaneous expulsion of the free water contained in the solution a casein product is produced which differs materially from the prior existing casein powders in physical properties and probably also in the percentage of combined water which it contains.

In practice a casein solution is formed from milk casein in any suitable way—for instance, by dissolving casein in a watery solution of bicarbonate of soda. This solution is then dried in a thin film upon a surface which is heated to such a high temperature that the heat acting upon the thin film of the solution expels the free water contained therein very quickly, almost instantaneously. This method of drying effectually dries the film without affecting the color of the product or causing any decomposition or other undesirable change in the casein. This method of drying can be carried on successfully under atmospheric pressure at a temperature of from 212° to 220° Fahrenheit on any suitable or well-known drying apparatus having a rotary steam-heated surface, upon which the solution is distributed in a thin film.

PROCESS OF MAKING ACETIC ANHYDRIDE.

Bernhard Heymann, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Company of New York, N. Y. No. 683,464, dated October 1, 1901.

This invention relates to a new and useful process for the production of acetic anhydrid. This process consists in treating salts of this acid, especially the alkaline salts, with a mixture of chlorin and sulfurous anhydrid, (SO_2), by means of which operation the said salts are transformed into acetic anhydrid in a very profitable manner.

WATERPROOF COATING.

William A. Hall, of Bellows Falls, Vermont, assignor to the Casein Company of America. No. 684,509, dated October 15, 1901.

This invention or discovery has for its object to produce a waterproof porous coating especially adapted for use in enameling playing-cards and other similar paper articles to which it is desired to impart glossy water-repellent surfaces which are still sufficiently porous to take printing-ink.

This improved sizing of waterproofing composition consists of a base preferably of satin-white (precipitated sulfate of calcium) and casein dissolved in a suitable alkali (preferably carbonate of soda ammonia) and water. Instead of using satin-white alone as a base a mixture of satin-white and clay or blanc fixe may be employed. The preferable proportions of these ingredients, by weight, in a dry state are about eighty parts of the base, twelve to sixteen parts casein, and two to four parts alkali, although these proportions are capable of some slight variations. Some twenty-five parts or rather more of water will be added in mixing the ingredients for use.

PROCESS OF PURIFYING ANTHRACENE.

Ernst Wirth, of Dortmund, Germany. No. 685,895, dated November 5, 1901.

The claims describe:—

1. A process for separating carbazole and its homologues from crude anthracene by suspending the crude anthracene

in an indifferent solvent which dissolves anthracene very slightly but dissolves nitroso-carbazoles easily, and then treating this mixture with nitrous acid, substantially as described.

2. A process for separating carbazole and its homologues from crude anthracene by suspending the crude anthracene in an indifferent solvent which dissolves anthracene very slightly but dissolves nitroso-carbazole easily, and then treating this mixture with nitrous acid, separating the solution of nitroso-carbazole, obtained by this treatment, from the undissolved anthracene and splitting off nitric oxid from the solution of nitroso-carbazole by acids, the nitric oxid being converted into nitrous acid which is again used for treating further portions of crude anthracene.

PROCESS OF MAKING SULPHUR TRIOXIDE.

Henry Spencer Blackmore, of Mount Vernon, New York. No. 686,021, dated November 5, 1901.

The object of this invention is to produce sulfur trioxid in a rapid and economical manner; and it consists, essentially, in displacing oxygen from a metallic oxid in the presence of sulfur dioxid, whereby in its nascent state it combines readily without difficulty.

The claims describe:—

1. The process of producing sulfur trioxid, which consists in chemically displacing oxygen from a metallic oxid in the presence of sulfur dioxid, by action of a substance having greater affinity for the base of the oxid.

2. The process of producing sulfur trioxid which consists in exposing a metallic oxid to the action of sulfur dioxid and sulfur in a heated state.

3. The process of producing sulfur trioxid which consists in conveying into the presence of a metallic oxid, sulfur dioxid carrying free sulfur in a heated state.

4. The process of producing sulfur trioxid which consists in heating sulfur dioxid, impregnating the same with free sul-

fur, and conveying the heated mixture in contact with a metallic oxid.

5. The process of producing sulfur trioxid which consists in exposing iron oxid to the action of sulfur dioxid and sulfur in a heated state.

6. The process of producing sulfur trioxid which consists in heating sulfur dioxid, introducing sulfur into the same, and conveying the mixture in the presence of iron oxid.

PROCESS OF MAKING SULFURIC ANHYDRIDE.

Henry Spencer Blackmore, of Mount Vernon, New York.
No. 686,022, dated November 5, 1901.

The object of this invention is to produce sulfuric anhydrid (sulfur trioxid;) and it consists in oxidizing sulfur dioxid by action of a metallic oxid or substances containing the same.

The clams describe:—

1. The process of producing sulfuric anhydrid (SO_3) which consists in oxidizing sulfur dioxid by the action of metallic oxid.

2. The process of producing sulfuric anhydrid, which consists in conveying sulfur dioxid in contact with metallic oxid at a temperature below the dissociating-point of sulfur trioxid.

3. The process of producing sulfuric anhydrid, which consists in exposing a metallic oxid to the action of heated sulfur dioxid.

4. The continuous process of producing sulfuric anhydrid (SO_3) which consists in exposing metallic oxid to the action of sulfur dioxid at a temperature below the dissociating-point of sulfur trioxid, conveying the sulfur trioxid produced to a condenser, elevating the temperature of the metallic residue, passing oxygen over the same, cooling, exposing the product to the action of more sulfur dioxid and continuing the process as before.

5. The process of producing sulfuric anhydrid, which consists in exposing iron oxid to the action of sulfur dioxid in a heated state

PROCESS OF PURIFYING LACTIC ACID.

Charles N. Waite, of Cranford, New Jersey. No. 686,170, dated November 5, 1901.

The process described in this invention is based on the discovery that when crude lactic acid and amyl alcohol, $C_5H_{11}OH$, (fusel oil,) are mixed by agitation or otherwise and then allowed to separate by gravity the alcohol, which is not a solvent of the ordinary impurities of crude acid, rises to the top, carrying with it lactic acid practically free from all impurities except a trace of coloring-matter. When equal bulks of crude acid and amyl alcohol separate after mixture, as above described, the alcohol contains about one-half as much acid as is left in the aqueous solution. The upper stratum of alcoholic solution is decanted and fresh alcohol is mixed with the crude acid remaining. This also is allowed to separate, and the alcoholic solution of acid is decanted as before, and this process is repeated until the acid is practically all removed from the impure aqueous solution. The aqueous residue may be heated to recover the dissolved alcohol and then thrown away. The alcoholic solution of acid may be treated in two ways. It may be mixed with pure water and distilled in the presence of aqueous vapor and the alcohol recovered, leaving the acid in pure aqueous solution, which may then be concentrated to any desired degree, and the tarry coloring-matter may be removed by bone-black; or, and preferably, the alcoholic solution may be deprived of its acid by reversing the washing process and repeatedly washing the alcoholic solution with pure water, to which the alcohol gives up the acid, in the proportion of two parts of acid remaining in the water to one part left in the alcohol when equal bulks of each are used. When the alcohol has been practically freed from acid it may be used to wash out a fresh portion of crude acid. The pure aqueous solution is concentrated by boiling and decolorized as above described.

DETERGENT.

Shehadi A Shehadi and Adeeb Faris, of Providence, Rhode

Island. No. 686,665, dated November 12, 1901.

The primary object of this invention is to produce a compound adapted to the cleansing of Turkish rugs, carpets, and such other fabrics as contain wool or other staples which have serrated exteriors injured by the application of uncombined free alkalies. The inventors further secure the desideratum of avoiding the creasing of the fabric to which the compound is applied.

The composition consists of the following ingredients, compounded in the proportions stated, viz: water, substantially pure, one gallon; ammonia, one ounce; carbonate of potash, two ounces; caustic potash, ten ounces; extract of peppermint, one-eighth of an ounce; extract of laurel, one ounce; rose-water, one ounce. The strength of the extract of peppermint should be from two and one-half to ten per cent., and the strength of the extract of laurel should be from five to fifteen per cent. These ingredients are to be thoroughly mingled by agitation.

COMPOSITION FOR WATERPROOFING FABRICS.

Harold Dennet Heather, of Auckland, New Zealand. No. 687,685, dated November 26, 1901.

In carrying out this invention it has been found by careful experiment and trial that very excellent results in the production of this new or improved waterproofing composition are obtainable by combining the before-recited ingredients in or about the following proportions: zinc-white, (or white lead,) two pounds, by weight; beeswax, one pound, by weight; turpentine, three pints, by measure.

The method or process it is preferred to adopt in the manufacture of this new or improved waterproofing composition is to carefully boil the ingredients when mixed in the above proportions until they attain a temperature of not more than 212° Fahrenheit to insure the perfect blending of the same together. The resultant waterproofing composition or mixture is then ready for immediate use, or it can be packed or stored.

METHOD OF MAKING SULFURIC ANHYDRIDE.

Carl Johann Eugen de Haén, of List, Germany. No. 687,834, dated December 3, 1901.

The inventor has discovered that sulfurous acid may be easily converted into sulfuric anhydride by conducting a mixture of sulfurous acid and atmospheric air over finely divided vanadic acid. At a temperature of 465° centigrade eighty-four per cent. of the sulfurous acid is converted into sulfuric anhydride. For carrying out the process it is advantageous to impregnate asbestos with a solution of a vanadium salt dry and calcine it, thus obtaining the vanadic acid in a state of fine subdivision. Instead of asbestos, pumice stone or other highly porous mineral matter may be used.

PROCESS OF PRODUCING CHEMICALLY-PURE HYDROCHLORIC ACID.

Eugen De Haén, of List, near Hanover, Germany. No. 687,994, dated December 3, 1901.

The inventor has devised a process for refining hydrochloric acid by which not only an inexpensive plant, but also an inexpensive treatment of the crude acid, is used and by which the purification of the acid after the same has been freed of arsenic by any known method can be carried out at a very much reduced price as compared to the processes heretofore in use. The process can be used for producing hydrochloric acid of any desired degree of consideration. For this purpose the process consists in continuously mixing crude hydrochloric acid after it has been freed from arsenic with boiling diluted sulfuric acid whose degree of dilution is such that its boiling-point is only about ten degrees above that of the crude hydrochloric acid and then condensing the vapors distilled off, whereby pure hydrochloric acid of the same strength as the crude acid is obtained.

APPARATUS FOR THE MANUFACTURE OF SULFURIC ANHYDRIDE.

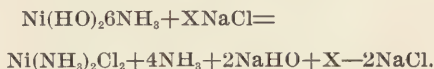
Rudolf Knietsch, of Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik, of Ludwigshafen, Germany. No. 688,020, dated December 3, 1901.

This invention is intended to provide an apparatus for overcoming the difficulties which have prevented the commercial success of the contact method of manufacturing sulfuric anhydride. The inventor has discovered that the high temperature generated by the formation of the SO_3 from SO_2 was the cause of the low yield of the anhydride and this apparatus is designed to absorb this heat so that a full yield of SO_2 is obtained.

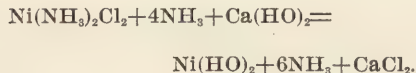
METHOD OF MAKING CAUSTIC ALKALI.

Hans A. Frasch, of Hamilton, Canada. No. 688,463, dated December 10, 1901.

The inventor finds that the nickel-ammonium salt described in Patent No. 669,899 being insoluble in ammoniated-salt brine can be utilized for the manufacture of caustic soda or potassium, nickel hydroxid being used as the means to bring about the reaction by the following formula:



The nickel-ammonium salt being insoluble in ammoniated-salt brine precipitates as described in the said concurrent application. This salt is separated by means of filtration or otherwise from the remaining salt brine and sodium hydrate and is reconverted to the hydrate according to the following formula:



This reaction taking place in presence of water, upon boiling the ammonia is recovered in anhydrous form, while the nickel is recovered by means of filtration in the form of nickel hydroxid, both of which are again used over as stated above.

In place of nickel hydroxid nickel oxid may be used for obtaining the initial ammoniacal solution; also, the hydroxid of cobalt may be used in place of nickel, the resulting reactions remaining the same, or any other hydroxid of a metal which is capable of forming an ammonium double salt which is insoluble in ammoniated-salt brine may be used.

APPARATUS FOR THE MANUFACTURE OF SULFURIC ANHYDRIDE.

Rudolf Knietsch, of Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 688,469, dated December 10, 1901.

This is a specific form of construction of an apparatus for the purpose generally described in Patent No. 688,020.

APPARATUS FOR THE MANUFACTURE OF SULFURIC ANHYDRIDE.

Rudolf Knietsch, of Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 688,470, dated December, 10, 1901.

The form of apparatus described is adapted for carrying out the necessary cooling described in Patent No. 688,020, by means of some cooling medium such as air with the aid of proper mechanical appliances.

APPARATUS FOR THE MANUFACTURE OF SULFURIC ANHYDRIDE.

Rudolf Knietsch, of Ludwigshafen, Germany, assignor to the

Badische Anilin and Soda Fabrik. No. 688,471, dated December, 10, 1901.

The form of apparatus particularly described in this is characterized by having the contact-chamber inserted into a tubular pocket or chamber closed at the bottom and which is provided with an entrance at the top for the sulfurous gases to be operated upon. This is designed for the purpose of carrying out the method of cooling described in Patent No. 688,020.

APPARATUS FOR THE MANUFACTURE OF SULFURIC ANHYDRIDE.

Rudolf Knietsch, of Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 688,472, dated December, 10, 1901.

The form of apparatus here particularly described is specially adapted for operating with a gas rich in sulfur dioxide. The principle of operation is that described in Patent No. 688,020.

APPARATUS FOR MAKING SULFURIC ACID.

Theodore Meyer, of Offenbach, Germany, assignor of one-half to Charles Glaser, of Baltimore, Md. No. 688,538, dated December 10, 1901.

The claim is for:—

In a sulfuric acid apparatus the combination of a series of circular or substantially circular chambers connected by pipes, each chamber having a single inlet pipe and a single outlet pipe, the single inlet pipe of each chamber entering it at the top only and tangentially and the single outlet pipe descending and leaving the chamber from the center of the bottom, whereby gases are admitted at the top of the chamber, permitted to rotate in the chamber, and as they cool and descend drawn off from the center of the bottom of the chamber in a downward direction.

METHOD OF MAKING SULFURIC ACID.

Theodore Meyer, of Offenbach, Germany, assignor of one-half to Charles Glaser, of Baltimore, Md. No. 688,872, dated December 17, 1901.

The claim covers:—

The method of making sulfuric acid which consists in imparting to the gases of which the sulfuric acid is made, a circular spiral volute motion within a chamber, the gases being introduced at the top and withdrawn at the bottom of the chamber. By this the gases are intimately mixed, active chemical action is caused and they are cooled by contact with the external walls of the chamber during an extended path of travel.

PROCESS OF PREPARING VISCOSE.

Charles N. Waite, of Cranford, New Jersey, assignor to Cellulose Products Company, of Wilmington, Delaware. No. 689,336, dated December 17, 1901.

This invention relates especially to the preparation of viscose by treatment of cellulose, cellulosic raw materials, and similar compounds with caustic alkali and carbon disulfid after the general manner set forth in United States Patent No. 520,770.

Viscose prepared in accordance with the above-mentioned specification is liable to spontaneous decomposition, as a result of which the cellulose which it contains splits off from the compound in an amorphous and hydrated condition. This decomposition, according to the conditions to which the compound is exposed, may occur within a few hours or at most within a few days of the preparation of the compound and seriously limits the usefulness and value of the viscose in case of many applications.

The inventor has discovered that the addition of ordinary spirits of turpentine, either to the alkali cellulose prior to its treatment with bisulfid of carbon or to the viscose resulting from the treatment with bisulfid or to the viscose solution in water, greatly prolongs the life of the compound.

METHOD OF TREATING VISCOSE.

Charles N. Waite, of Cranford, New Jersey, assignor to Cellulose Products Company, of Wilmington, Delaware. No. 689,337, dated December 17, 1901.

In the preparation of viscose as ordinarily carried out after the manner set forth in United States Patent No. 520,770, and especially in the case of treatments specified in United States Patent No. 604,206, having for their object the recovery from the viscose of modified cellulose in the form of sheets or masses, there occurs often an efflorescence of salts, by which the quality and structure of the surface of the sheet or mass are impaired, and also there occurs the formation of minute crystals throughout the substance of the sheet or mass which break down the continuity of the material and reduce its transparency.

This invention has for its object to prevent this efflorescence and also overcome the tendency to the formation of crystals within the mass during drying, whereby the quality of the product is materially improved. The inventor has discovered that this efflorescence during drying may be prevented and its attendant evils avoided, while at the same time the tendency to the formation of crystals within the mass is overcome by the admixture with the viscose of a strong solution of silicate of soda.

METHOD OF MAKING SULFATES AND CHLORIN.

Adolf Clemm, of Mannheim, Germany, No. 689,461, dated December 24, 1901.

The claims cover:—

1. The method of manufacturing sulfates and chlorin, which consists in first mixing chlorids with clay, adding sufficient water to the mixture to obtain a plastic mass, forming balls from the mass, drying said balls, and heating the dried balls above the melting-point of the chlorids while at the same time subjecting them to the action of sulfurous acid and oxygen.

2. The method of manufacturing sulfates and chlorin, which consists in first mixing chlorids with clay, adding sufficient water to the mixture to obtain a plastic mass, forming balls from the mass, drying said balls, and heating the dried balls above the melting-point of the chlorids while at the same time subjecting them to the action of sulfuric anhydrid and oxygen.

METHOD OF MAKING AMMONIA FROM WASTE PRODUCTS.

Eduard R. Besemfelder, of Charlottenburg, Germany. No. 689,780, dated December 24, 1901.

This invention relates to an improved process of treating nitrogenous waste products obtained in the arts, and in particular from the waste lyes of beet-sugar factories; and the object is to provide a process for the economical utilization of these wastes.

The invention consists of a process for this purpose comprising the following steps: first, subjecting the waste product to dry distillation; second, conducting the gases thereby obtained in contact with a heated aluminate; third, removing from the resulting gas mixture carbonic acid by conducting the gas mixture in contact with an alkaline lye, and fourth, removing the ammonia from the gas mixture by conducting the same in contact with calcium diphosphate.

The invention consists, further, in a process comprising these steps, with the qualification, however, that the waste product is subjected in contact with alumina to the dry distillation; and the invention consists, lastly, in such a process wherein also the material is subjected after the distillation to a water-gas process, and the slag thus obtained employed as the aluminate in the second step. The process may be carried out in any suitable apparatus.

METHOD OF MAKING SULFURIC ANHYDRIDE.

Rudolf Knietsch, of Ludwigshafen, Germany, assignor to the Badische Anilin and Soda Fabrik. No. 690,062, dated December 31, 1901.

The claims cover the process of making sulfuric anhydride as carried out in the various appliances described in Patents Nos. 688,020, 688,469, 688,470, 688,471 and 688,472. The inventor has discovered that the formation of SO_3 from SO_2 (+O by the contact method) depends upon the proper regulation of the temperature of the gases all these patents relate to this discovery.

PROCESS OF MAKING SULFURIC ANHYDRIDE.

Adolf Clemm and Wilhelm Hasenbach, of Mannheim, Germany. No. 690,133, dated December 31, 1901.

According to this invention the roaster-gases produced from sulfurous pyrites with the admission of previously dried air are conducted once only over highly-heated burnt pyrites or other substance containing ferric oxide, and afterward the gases are subjected to dry filtering and then admitted into the platinum contact space or chamber.

ACID SALT OF PHENYL-GLYCOCOL-ORTHO-CARBOXYLIC ACID AND PROCESS OF MAKING SAME.

Paul Seidel, of Ludwigshafen, Germany, assignor to Badische Anilin and Soda Fabrik. No. 690,325, dated December 31, 1901.

This invention relates to a process for producing phenyl-glycocol-ortho-carboxylic acid. The process consists in bringing anthranilic acid and chlor-acetic into reaction with one another in aqueous solution in the form of their neutral salts, or a sufficient quantity of a suitable base can be added to the solution of equi-molecular proportions of the acids, so as to neutralize them. The advantages of the process are that the

reaction proceeds smoothly at a low temperature, so that a decomposition of the phenyl-glycocol-ortho-carboxyl acid formed is avoided. On the other hand, owing to the formation of hydrochloric acid during the reaction a new acid salt of phenyl-glycocol-ortho-carboxylic acid is obtained, and this is almost entirely insoluble in cold water and only slightly soluble in moderately-warm water, so that as it forms it separates almost completely from the solution and is consequently removed from any further reaction with the chlor-acetic acid, so that the formation of anthranilo-di-acetic acid is hindered. The reaction may be effected in the cold, in which case it proceeds slowly; but if the temperature be raised—say to about forty (40°) degrees centigrade—a rapid reaction sets in, which, however, gradually proceeds more slowly. The new acid salt of the phenyl-glycocol-ortho-carboxyl acid soon begins to separate out. It can be collected and the mother-liquid again warmed or allowed to stand for a long time, if desired, after being enriched by the addition of a further quantity of the alkaline salts of anthranilic acid and chlor-acetic acid and in this way a further quantity of the desired product obtained.

ACYLATED INDOXYLIC ACID AND PROCESS OF MAKING SAME.

Daniel Vorlaender and Bruno Drescher, of Halle-on-the Saale, Germany, assignors to Badische Anilin and Soda Fabrik. No. 690,332, dated December 31, 1901.

The inventors have discovered that valuable mono-acylated compounds of indoxylic acid or indoxyl can be obtained by causing a moderate reaction to take place between indoxylic acid or indoxyl or salts thereof and, on the other hand, acetic anhydrid, acetyl chlorid, benzoyl chlorid, or similar acid derivatives, all of which are hereinafter included in the expression "organic acid derivative." As indoxylic acid readily changes into indoxyl, emitting carbonic-acid gas, it usually happens that upon acylating indoxylic acid the acyl derivatives

of indoxylic acid and indoxyl are obtained in one operation. According to the nature of the initial material used and from the method of working the acyl compounds of indoxylic acid or of indoxyl can be obtained as the principal or sole product. The claims relate to the production of the acyl derivatives of indoxylic acid.

PROCESS OF MAKING ACETYL-PHENYL-GLYCOCOL- ORTHO-CARBOXYLIC ACID.

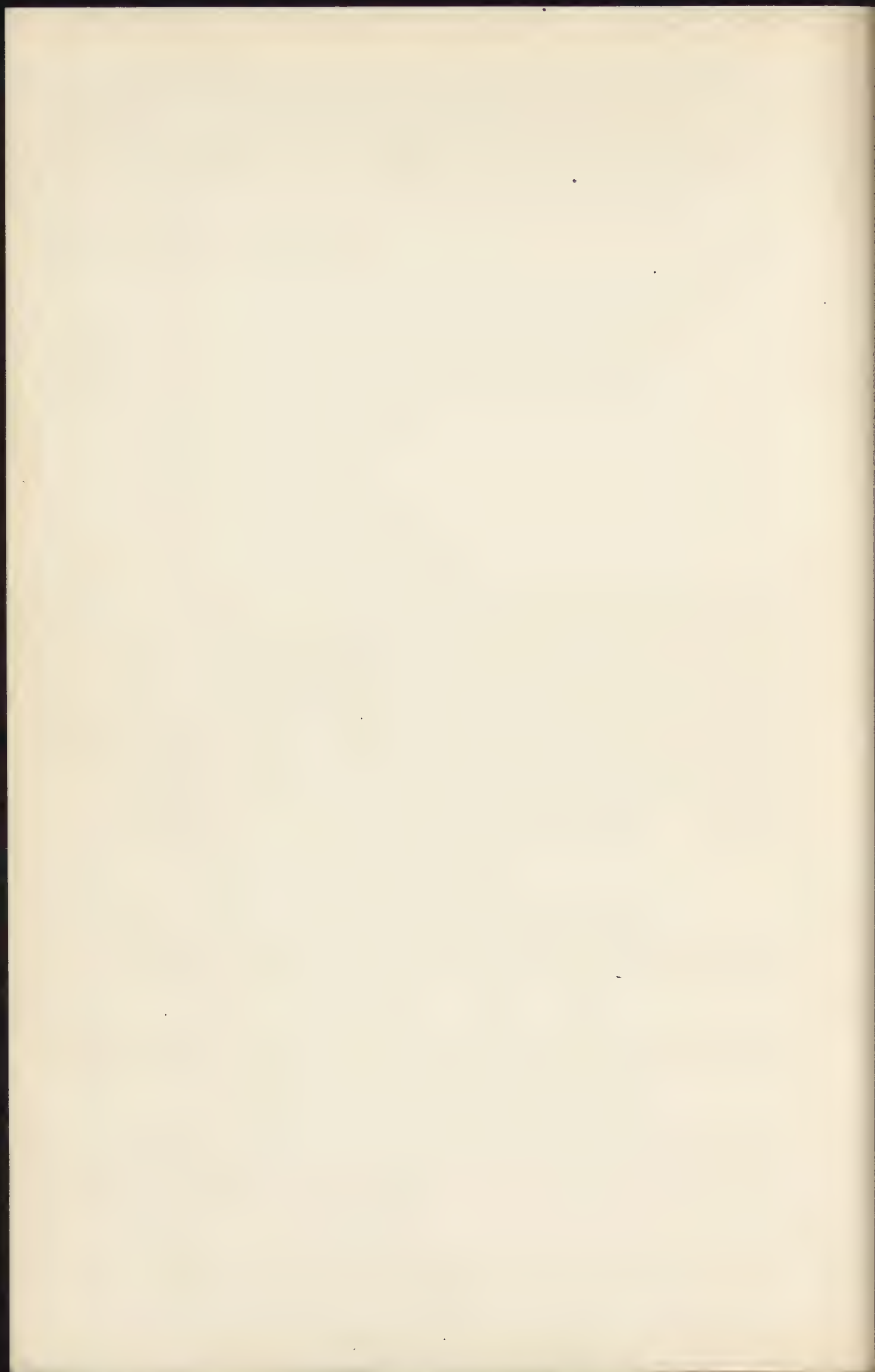
Fritz Bender, of Frankfort-on-the-Main, Germany, assignor to Farbwerke Muehlheim. No. 690,346, dated December 31, 1901.

Acetyl-phenyl-glycocol-ortho-carboxylic acid is of importance because its esters can readily be converted into indigo coloring-matters. Hitherto it has only been prepared by the oxidation of acetyl-ortho-tolyl-glycocol.

The inventor has now discovered that the desired acetyl compound can be obtained quantitatively by treating phenyl-glycocol-ortho-carboxylic acid with acetic anhydrid in neutral solution or in solution in the presence of sodium acetate or an excess of an alkali. The acetyl compound resulting remains in solution, but is precipitated on acidifying with a mineral acid.

PART IV.

NOTES ON PROCESSES.



BLEACHING, SCOURING AND FINISHING
DYEING, PRINTING.



NOTES ON PROCESSES.

NEW BLEACHING AGENT.

According to a recent patent, when sodium peroxide is mixed with an equal weight of slaked lime, on exposure to moist air, free from carbonic acid, dioxyhydrate of calcium and caustic soda are formed, which latter compound can hereafter be removed by washing. The same product can be obtained by treatment of peroxide of sodium with milk of lime or with various soluble salts of calcium. The new product is to be used for bleaching wool and other materials, and will most likely, on account of a lesser alkalinity, possess certain advantages over the sodium compound now in use.

BLEACHING COTTON AND FLAX.

An improved method in bleaching vegetable fibres, which is specially applicable to cotton and flax, has recently been introduced with the object of providing a means for safely carrying out a drastic alkaline treatment under the condition of reducing to a minimum the proportion of alkaline lye to the material treated. In ordinary boiling in vomiting kiers the

proportions of liquor to goods is from 7 or 10 to 1; in kiers with a forced circulation it has been possible to reduce this to about one-half the above proportion. In the new method the proportion is so far reduced that the process becomes one of steaming (in contact with the active solution) rather than boiling, and the circulation of the solution is consequently dispensed with. At the same time, with the more active alkali, such as caustic soda, other reagents are combined having specific effects (a) upon the physical properties of the active solution, (b) upon those constituents of the fibres which it is required to attack and remove.

For treating linen webs, an aqueous solution of 1 to 2 per cent. of caustic soda is prepared, to which is added silicate of soda to increase its viscosity, and a mineral or other suitable oil emulsified with a soda or potash soap solution. The proportion of the ingredients of the mixture may be varied. The following mixture is suitable for linen webs: 1.75 pounds of soap, e. g., potash fish oil or soft soap; 14 pounds of silicate of soda, with a silicate ratio $\text{Na O}_3\text{SiO}$, and containing by weight 30 per cent. SiO_2 ; 1.5 pounds of caustic soda, NaOH ; 1.75 pounds of oil—generally mineral or petroleum oil of high boiling point, but in some cases it may be a fatty oil or a mixture of fatty with mineral oil, and its quantity may be varied; and 10 gallons of water.

For treating flax goods of open texture, such as cambrics or damasks, the water is increased to 15 gallons, retaining the above proportions of the other ingredients. This mixture at 30–40° C. is of a gelatinous character, so that it does not run to form uneven patches. The webs of linen or cotton are run through it full width, becoming equally saturated by squeezing rollers, and then formed into a roll or batch, in the following manner: The fabric at its full width is led into a chamber containing steam at atmospheric pressure, and then is wound into a roll. It is essential that before the web is rolled it should be exposed at its full width to steam, so that both the web and the agents with which it is impregnated become uniformly heated together, thus insuring equal action on all the layers of the roll. On the outside of the roll a few folds of

fabric, which may be remnants or fents, also saturated with the solution, should be wound to form a protective covering, and prevent unequal action on the fabric. When the rolling is completed, the opening into the chamber is closed and the roll is exposed to the action of dry steam at pressure, usually not exceeding 4 pounds per square inch, for one to four hours. By this treatment with steam, the special alkaline mixture described is made to saturate uniformly the whole mass of fabric, and to attack powerfully its non-cellulose constituents, so that they are brought to a soluble condition. The goods, while still in the chamber, are then thoroughly boiled under pressure with weak alkaline solution, which may be soda or sodium silicate. After the boiling the goods are cleaned by thorough washing, which is also conducted under pressure if necessary.

The successive operation of winding the webs into a roll or batch, steaming the roll, boiling it in a clearing solution circulated through the roll, and finally washing the roll, are to be carried on without exposure to the air until all the non-cellulose ingredients are cleared away, which result could not be attained if the operations were interfered with by lowering of the temperature or exposure to the atmosphere. This operation may be carried out in many cases upon the brown or gray goods; in other cases it is necessary to prepare the goods by a preliminary lime boil or other scouring process. By the treatment above set forth, linen webs are said to be brought at once to the condition suitable for the dipping and first course of bleaching operations. Cotton fabrics are so far advanced that they may be completely bleached by the ordinary treatment with bleaching-powder solution, scouring, and washing.

The mechanical arrangements for treating yarns require to be modified. Warps or chains may be saturated with the active solution in continuous length, as in the case of fabric; but for impregnating yarns in the hank, it is convenient to operate as in a dyeing process by immersing them in the solution, and applying the usual manipulation for evenly distributing the solution, then laying them up to drain, and freezing them from excess of solution by squeezing rollers or centri-

fugal action. The yarns may then be placed in a cage to be steamed, this cage being preferably lined with remnants of fents (which had been also impregnated with the alkaline solution) to protect the outside portions of the yarn. For goods of comparatively slight make, whether fabric or yarn, the proportions of the chemical agents in the active solution are reduced, especially the caustic soda, the proportion of which may be from a 0.5 to a 1.5 per cent. solution; and the same applies in producing limited bleaching effects, such as half bleaches and scoured shades.—*Textile Manufacturer.*

SULPHUR BLEACHING OF WOOLEN GOODS BY THE WET PROCESS.

In order for the manufacturer of woollen goods to obtain clear and bright whites on his fabrics, it will be necessary, in the first place, to use as his raw material wool stock that is naturally of a white color and quite clean and free from extraneous coloring matters. He should also give close attention to the scouring processes, for the inability of several bleaching processes to produce good results, is traced directly to inefficient cleansing in the first instance.

The three chief processes for bleaching wool are as follows:—

1. With sulphurous acid.
2. Sulphurous acid and permanganate of potassium.
3. With peroxide of hydrogen.

Recently, however, a fourth process has been devised, based upon the use of electricity, but as yet it has not reached a commercially practical stage, although, no doubt, the near future will bring forth an electrolytic method that will be a success.

Schreiber has shown that by making use of the sulphurous acid and permanganate method, results in bleaching wool are obtained that are the equal of those obtained by any other process, the whites being good and lustrous. To carry out this process for piece goods, two small vats or tubs are required, which are provided with wooden rollers, so that the fabrics may not be stained by rust which would occur should metal be used.

For bleaching, say 80 lbs. of goods, two vats, each six feet long by three feet wide and three feet deep, will be necessary. One of these vats is provided with a securely-fitting lid or cover that can be shut down.

In order to bleach the 80 lbs. of material, 1 lb. of permanganate of potassium is dissolved in about 1 gal. of warm water, and then passed through a moderately fine hair sieve into the open vat, which has been previously filled with water. After being thoroughly mixed, the goods are entered and worked in this bath for 1-2 hour, during which time the fabric assumes a pale brick red color, after which it is lifted out and allowed to well drain.

The second (or covered vat) is filled with water to which has been added 1-2 gal. of liquid sulphurous acid, mixed well, and then the goods are entered and worked as in the previous operation. In this second immersion the red color of the wool will gradually disappear, although the immersion continues for some hours. Schreiber mentions 12 to 18 hours, but frequently less time is required; the finer the grade of wool in the first instance, the shorter will be the time. After the expiration of the proper time for the necessary degree of whiteness, the goods are lifted out, allowed to drain thoroughly, folded and laid aside in a clean place.

If the white obtained requires a bluish or reddish tinge, it is effected by steeping the goods in a bath containing from 4 to 10 grs. of neutral aniline blue or methyl violet 6R.

The two bleaching baths are permanent and simply require replenishing with the original quantities of ingredients. There is no doubt but that for the very finest kinds of woollen fabrics there is no better method of bleaching than those dependent

upon the use of sulfurous acid in solution. The "sulfur-house" method is quite useful for medium and coarse yarns and fabrics, but has never given the best satisfaction for the finer qualities.—*Textile Record*.

SCROOP ON MERCERIZED COTTON.

Scroop can be imparted to mercerized cotton by passing the material several times through a solution of Marseilles soap and acetic or tartaric acid. The goods are not rinsed but simply extracted and dried so that the acid evaporates from the fibre. The greater the evaporation of acid, the more durable is the scroop or rustle of the goods. The strength of the bath for any particular case can be determined best by experiment.

SOME NEW METHODS IN DYEING.

During the past few months many small innovations in the methods of applying dyes and dyestuffs to the dyeing or printing of textile fabrics have been brought before the notice of dyers and printers. These are of interest, and may be of service under some conditions but it is quite possible that they may be unknown to a number of our readers, and so we think that a brief account of some of these new developments may not be without interest, and possibly bring under their notice methods of working with which they were not acquainted, and that might possibly be of use to them.

The principle of bottoming cotton with various blue dye-stuffs for indigo dyeing in the vat process, with the object of working at a cheaper rate, is pretty well known and much practiced. The difficulty is to find a dye that will resist the application of the indigo vat and be sufficiently cheap; then, of course, the dyestuff must produce a blue not unlike that of indigo. Melanogen Blue B of the Farbwerke vorm. Meister, Lucius & Bruening seems to have some advantages in this direction that are worth attention. The cotton yarn or cloth is dyed direct from baths of Glauber's salt, and the use of 2 per cent. of Melanogen Blue B makes a sufficiently good bottom. The material is next topped with the indigo vat, using a zinc-lime vat, and if Synthetic Indigo MLB be used very good results are obtained. After dyeing, the cotton is soured off, using two pounds sulphuric acid in 100 gallons of water. By adding copper sulphate to the scouring bath greenish shades are obtained, which are faster to washing and rubbing than the uncuppered blues. Up to 2 per cent. of Melanogen Blue bottom the nitric acid spot test shows little or no difference from that of a pure indigo blue, but beyond that amount there is a difference, the spot becoming redder in hue.

With the Melanogen Blue bottom, discharge effects can be obtained as with indigo, using the ordinary bichromate discharge process. White, yellow and red designs can be obtained, scarcely distinguishable from the results with ordinary indigo, while the cost is less. We may note that the Melanogen Blue B appears to act as a fixing agent for the indigo, and less labor is needed in the topping bath to obtain the same shade of blue.

When cheap cloths are produced from shoddy materials, the cotton fibres and threads are apt to come up after the dyeing process, white or but faintly tinted, which is considered a defect. It is not at all easy to cover up these threads. Usually attempts are made to use logwood in cold baths, but the results are not always satisfactory. Advantage may be taken of the fact that Dianil Black CR will dye cotton very well from soap liquors, while under the same conditions it will not touch the wool. With it, therefore, the covering of the cotton may

be done during the milling operation. The following mode of working gives good results: The goods are well rinsed and then put into the milling machine, and for every piece of about twenty-five pounds weight, four ounces of Dianil Black CR, previously dissolved in a little of the soapy milling water, is added, and the milling proceeded with; about ten to fifteen minutes before the end of the operation, two pounds of Glauber's salt are added in order to ensure the complete exhaustion of the dye from the liquor.—*Cotton, Atlanta, Ga.*

TEMPERATURE IN DYEING WOOL-SILK FABRICS.

Fabrics composed of wool and silk probably offer the best illustrations of the effect of temperature. Both are animal products, and having many properties in common, we might reasonably expect them to behave similarly in the dye bath. To a certain extent this is indeed the case, but the resemblance is only a partial one. Silk may often be successfully mordanted by a mere steeping in cold solutions, which have no such effect on wool, and in dyeing it is generally true that the maximum dyeing effect of a given coloring matter takes place at a lower temperature on silk than on wool. This is the fact which chiefly determines the methods for dyeing unions composed of wool and silk. Here we only will say that a few acid dyestuffs will dye both fibres alike at or near the boil, but it is usually necessary, both for solid shades and for two-color effects, to dye the wool first at the boil and afterwards dye the silk in a cold or lukewarm bath with the same or different dyestuffs. A few colors, notably rhodamine, are attracted by silk very much more than by wool, even in a boiling solution, and "shots" may sometimes be dyed in this way in a single boiling dye bath.

By making application of the effects of temperature, almost any desired shade or shades may be obtained on union fabrics of all descriptions. It is even possible to dye fabrics containing wool, silk and cotton in three different shades. The wool is first dyed with an acid color at the boil, the silk with another acid at 40° C. and a third and cold dye bath of a direct coloring matter, such as a "Mikado" color, imparts a distinct shade to the cotton. It must be remembered that a considerable variation of results may be caused by varying proportions of different fibres in the fabrics, or by variations in the quality of the one or the other fibre. The results may also be affected by the addition of varying quantities of acid or other assistant to the dye bath.—*Textile Mercury*.

A NEW METHOD OF USING BASIC DYESTUFFS.

It is well known that the usual method of fixing basic dyestuffs on vegetable fibre is a long and complicated operation requiring three baths.

1. The mordanting with tannin.
2. Fixing in a bath with a metallic salt such as tartar-emetic, and—
3. The dyebath.

This requires considerable time and labor. In this connection, Max Becke and Herman Bablich, of Hoechst-on-Main, Germany, have made an interesting discovery that a new method applicable to a large group of basic dyestuffs, and, particularly, basic polyazo dyestuffs, having as components aromatic amidoammonium bases or amidobenzylamine or their derivatives, and the basic momoazo dyestuffs derived from diazo safranines. They have found that these basic azo

dyestuffs may be directly fixed on the fiber without a mordant if the operation is carried out in a neutral or slightly acid bath with the addition of Glauber's or common salt. The temperature may be from 180° to boiling. After dyeing, these colors may be fixed by treatment with solutions of tannin and antimony salt, or a mixture of both, either in the dyebaths, or in the second baths for the purpose of forming the tannin antimony color lakes on the fiber. This treatment will give good results, even if the second baths contain principally, insoluble tannate of antimony, and in this case, the results as regards even dyeing and fastness are very good.

It is evident that the affinity of these dyestuffs for the fiber is so great that the tannate of antimony not only does not strip off the color, but is itself attracted by the dyestuffs on the fiber, in this way, forming the insoluble color lakes. On this account this new method is superior to the old one, as the number of baths is reduced—one, or at the most, two, being all that are necessary for the production of fast colors. Another advantage in this connection is that the shades come out much more level than by the old method of mordanting first and dyeing afterwards.

This new method is found to be applicable to all such strong basic diazo dyestuffs as contain as first component a diazotizable ammonium base (meta and para-amidophenyl-trialkylammonium, para-methyl-ortho-amidophenyltrialkylammonium) or amidobenzylamine or its alkyl derivatives (para- and ortho-amidobenzyl-dialkylamine amidobenzyltrialkylammonium) in middle position, a further diazotizable amine (alpha-naphthylamine amidonaphtholethyl and methylether, para-xylylidine, symmetrical meta-xylylidine, meta-toluidine, meta-chloraniline, ortho-anisidine, ortho-phenetidin, ortho-amido-para-cresol-alkyl ether, para-chloro-meta-toluidine, &c.) in final position, a not-sulfonated amine or phenol capable of being combined (phenol, alpha-and beta-naphthol, amidonaphthols, dialkyl-meta-amidophenols and naphthols, meta-phenylene and toluylene-diamine chrysoidine, pyrazolene) as well as such basic diazo dyestuffs resulting from the action of amidoazo bodies upon 2.7 oxynaphthaline-trialkylammonium, and finally such

monoazo dyestuffs as result from the action of diazosafranines (also alkylated) upon alpha-and-beta-naphthol, dioxynaphthaline, phenol, dimethyl-and-diethyl-aniline, dimethyl and diethyl-meta-amidophenol, amido-naphthols, alkylamido-naphthols, alphanaphthylamine, toluylene diamin and phenyldiamine.

This method, which is limited to a certain group of dyestuffs, is based upon the previously unknown fact that the affinity of the dyestuffs for the vegetable fiber is greater than the tendency to form tannin antimony lakes. This characteristic is the reverse of that of most basic dyestuffs. The affinity of these for the vegetable fiber is so weak that even when applied by padding, they are stripped from the fiber by a subsequent treatment of tannin instead of being fixed on it.

This new method is suitable for the production of a great number of shades in the dyehouse, and the Farbwerke, vormals Meister, Lucius & Bruening, to whom the inventors have assigned the patent, have brought out a sample card this year illustrating the advantages of this process for which their group of Janus colors possesses special advantages.

FAST ACID MAGENTA G AND G CONC. PATENTED.

This is a new dyestuff which is suitable for producing pinks and light reds on all classes of woolen goods. It is dyed at a boil in an acid bath containing 20 per cent. of Glauber's salt and 5 per cent. of sulphuric acid with the required amount of color. As the color works perfectly even, additions to the dyestuff can be made in the boiling bath.

The Fast Acid Magenta G is recommended for piece and yarn dyeing, and also for slubbing as a substitute for Magenta, Acid Magenta and Rhodamine. Being faster than these, it is

suitable for replacing them in the production of bright reds and pink. It can be used as a shading color in other shade combinations, and as chromic acid does not affect it, it is also suitable for additions to the developing bath in after-chromed colors.

ACID ALIZARINE COLORS.

To their already well-known group of Acid Alizarine colors, the Farbwerke, vorm. Meister, Lucius & Bruening, have added during the year, Acid Alizarine Black 3 B, 3 B extra, and T, Acid Alizarine Grey G, Acid Alizarine Blue Black B, and Acid Alizarine Grenade R. These colors like the others in this group, are first dyed in an acid bath with sulphuric acid and Glauber's salt, and the color afterwards developed by the addition of bichromate of potash.

These dyestuffs are suitable for dyeing all classes of material and the fastness of the resulting shades is satisfactory in every particular. The dyeing operations may be described as follows:

For the following colors the dye bath is prepared with

5 per cent. of Oil of Vitriol.

20 per cent. of Glaubersalt.

and the necessary amount of color added. The goods are entered at about 150° F, raised to a boil in about half an hour and boiled an hour. Then the bath is cooled down somewhat, and the required amount of potassium bichromate added (usually about 3 per cent.). The bath is again heated and the goods boiled to shade.

Chromotrop S, Chrome Brown R O and B O, Acid Alizarine Grenade R Alizarine Red 1 W S, Mordant Yellow O, Alizarine Yellow G G W, Powder, Acid Alizarine Blue Black B and Acid Alizarine Black R and 3 B.

For Acid Alizarine Brown B the dye bath is prepared with only

3 per cent. of Oil of Vitriol.

20 per cent. of Glaubersalt.

The method of operation is the same as with the other chrome developed colors.

For Acid Alizarine Gray G it is best to start the bath with

20 per cent. of Glaubersalt.

5 per cent. of Acetic Acid.

Then after working for three-quarters of an hour 2 per cent. of Oil of Vitriol is added and the development proceeds the same as with the other colors.

Chromotrops F B and F 4 B. With these the dye bath is started with

3 per cent. of Oil of Vitriol.

20 per cent. of Glaubersalt.

and worked the same as the other colors, but in development along with the bichromate 2 per cent. of oil of vitrol should also be added.

A NEW METHOD OF USING SULPHUR DYES.

Max Becke and Albert Beil, of Hoechst-on-the-Main, Germany, have made the following investigation in connection with the use of sulphur dyestuffs. In dyeing with most of these dyestuffs great care is necessary that the goods shall not be exposed to the air, even for a comparatively short time, as this causes unevenness, by the dyestuffs separating out on the exposed portions. The investigators claim that the reason why the sulphur dyestuffs produce uneven colors under these conditions is, that the sodium sulphide, which either is contained in the color or added afterward to the dye bath, has a reducing influence on the dyestuffs, and besides the dissolved dyestuffs the bath also contains their leuco compounds. The dyestuffs and their leuco compounds appear to possess different affinities for the fiber, and, therefore, when the fiber dyed with the leuco compounds is exposed to the air it readily oxidizes at ordinary temperatures and forms the dyestuff directly on the fiber. This freshly formed dyestuff is not again reduced in the dyebath, as there is no excess of reducing agent present.

Based on these observations, the discoverers have found that good results can be obtained in using the sulphur dyes by transforming them completely into the leuco compounds, dyeing with them in this form and finally changing these compounds into the dyestuffs by oxidation in the air or oxidizing agents; in fact, using the dyestuffs according to the indigo vat dyeing process. The hydrosulphide vat is best suited for the reduction, and the results from the copperas or zinc vat are not so satisfactory. This is to be accounted for by the formation of compounds with the sulphur dyestuffs with the metallic salts present.

The preparation of the vat and method of dyeing are generally the same as with indigo, only the excess of lime is not required, as in the production of indigo white. The leuco compounds possess greater affinity for the fiber; they dye rapidly and evenly, and cold rinsing will hardly remove them. The oxidation of the shade begins immediately when the goods

are taken out of the bath and rinsed. After the formation of the dyestuff is completed by exposure to the air, the shade may be fixed by treatment with metallic salts or other oxidizing agents, as is done after dyeing with the bath containing alkali sulphide. As with the indigo vat, the same material may be passed through several times, the colors becoming stronger and deeper by giving them two or more runs. Shades treated after the first run with oxidizing agents, such as copper sulphate, yield on a second and subsequent runs much deeper colors than when merely exposed to the air between passages. The methods described may be of particular importance, as this use of the sulphur dyes may be combined with the vat dyeing of indigo, thus being possible to obtain in one vat combination shades of indigo with the fast sulphur dyestuffs. These colors will be cheaper than those obtained with indigo alone, and much faster than those obtained by topping indigo with other colors.

For vat dyeing the most suitable are the dyestuffs known as "Immedial Blue C," "Immedial Black G" and "V Extra," "Katigene Blue" and other sulfur dyestuffs. For the various kinds of materials the usual methods of handling Indigo vat are satisfactory.

A NEW GROUP OF DYESTUFFS.

A disadvantage in the use of the usual sulphide colors is that they require dissolving in a solution of sodium sulphide before being added to the dye bath. In working under these conditions, it is necessary to keep the goods entirely under the liquor, as the oxidation on exposure to the air, results in bronze streaks and uneven dyeing.

The members of this new group of sulphur colors, Melanogen Blue B, Melanogen T and G, and Thiogene Brown R, do not require any sodium sulphide for solution; therefore, the dyeing can be carried out directly without any special precautions. All these colors form lakes with metallic salts, which can be used for fixing the dyestuffs on the fiber.

MELANOGEN BLUE B. This dyestuff is freely soluble in water and may be dyed in the usual kettles made of iron or wood, and the steam pipes should be either iron or lead, as the tendency of metallic copper is to form lakes in the alkaline dye bath. With this exception, the ordinary dye vessels, which are used for dyeing the direct dyestuffs will answer all purposes.

The usual assistants for this color are carbonate of soda, and, either common salt, or Glauber's salt. By using standing kettles, the quantity of dyestuff can be considerably reduced, that is to say, a bath requiring 8 lbs. of Melanogen Blue B to produce a required shade, in the second bath, requires 7 1-4 lbs. and in the third bath, 6 1-2 lbs, thus showing a considerable saving. For lighter shades, the bath exhausts so well, that there is little economy in keeping them.

As fixing agents, the various metallic salts produce different shades, from a green to a pure blue shade, for example: Aluminum sulphate or ordinary alum. produces a pure blue shade, zinc sulphate, a reddish blue shade, cadmium sulphate, a dark blue, nickel sulphate, a green blue, and copper sulphate, a dark green. In the fixing bath with the metallic salt, basic dyestuff in small quantities may also be used without affecting the fastness of the color, and in this way a great variety of blue shades may be obtained. The Melanogen Blue B fixed with copper sulphate may also be used as a mordant for the natural wood colors, such as logwood and fustic extract, these forming the usual color lakes with the copper salt used as the fixing agent. This color is also suitable as a bottom for indigo and aniline black. The fastness of the colors obtained in this way is not impaired and the cost considerably reduced.

The shades obtained directly by the use of Melanogen Blue B are fast to water, washing and minding, but not absolutely fast to light. However, the shades developed with metallic salts are as fast as can be required for all purposes. Shades obtained in this way will stand even boiling with alkaline soap, and do not stain white cotton or wool under these conditions. They are fast to boiling in acids, and therefore, are suitable for dyeing warps for half wool material, which is to be over-dyed in an acid bath. The fastness to light of the fixed shades is very good and equal to indigo blue. The shades do not crock nor change by hot ironing.

MELANOGEN T AND G, Pat'd. Both of these products are dyed like Melanogen Blue B without any special precautions in the dyeing apparatus other than avoiding the presence of copper. The results are especially even, no spots or bronzy places appearing. They are especially suitable for producing blacks on loose cotton cops, yarns and warps. They also may be used on pieces since they produce on the winch and in the jigger level shades, and penetrate the heaviest goods without difficulty.

These blacks are fixed the same as the blue with metallic salt, such as copper sulphate, nickel sulphate, or a mixture of copper and zinc sulphate with the addition of small quantities of acetic acid. These also may be shaded by the use of basic colors in the fixing bath. The shades are fast to light, rubbing and washing. They may be boiled in an alkaline soap solution without bleeding into white or altering their shade. They are also fast to acids, and therefore for dyeing warps for half wool material for acid over-dyeing. They show no change in ironing or mangling.

THIOGENE BROWN R. This dyestuff is another member of this group and produces brown shades on all classes of cotton material. Like the other products no special precautions are required in the dye bath, and the ordinary dye tubs fitted with lead or iron steam pipes are used. No sodium sulphide is required for dissolving the color, and only the addition of soda and common salt or Glauber's salt to the dye bath is needed.

After dyeing the dyestuff is fixed by the use of copper sulphate, bichromate of potash, and sometimes, alum or aluminum sulfate. The shades may be topped, in all cases, with basic colors, and those fixed with bichromate of potash and alum may be dyed with alizarine colors.

The shades produced with Thiogene Brown R are remarkable for their great fastness in every particular; the shades which have not been topped being absolutely fast to boiling soap without staining; those topped with alizarine colors are sufficiently fast; but those which are topped with basic colors show a slight staining when boiled in soap and soda. The baths do not exhaust perfectly, and by using a standing kettle, a saving of about 15 per cent. can be effected.

MELANOGEN BLUE B. PAT'D ON COTTON YARN.

The first bath is prepared for 100 lbs. of material with from 2 to 8 lbs. of Melanogen and an equal quantity of soda ash and from 10 to 40 lbs. of common salt. The dyestuff is dissolved with half the quantity of soda and added to the dye-bath; the remainder of the soda and half the quantity of salt is then added, and the yarn entered at 170°. After 6 turns, the remainder of the salt is added, the temperature raised to 195°, and the dyeing continued for 3-4 of an hour. After dyeing, the yarn is thoroughly rinsed, and fixed in a fresh bath containing about 2 lbs. of acetic acid and about 12 ounces of the metallic salt for each pound of blue used. The bath should be started cold and worked gradually, during a half hour, up to 120°. The yarn is then thoroughly washed, soaped and dried.

By using copper sulphate as a fixing agent, green shades can be obtained which may be made fuller and brighter by top-

ping with fustic extract. This process is carried out by first fixing the color with about 2 lbs. of copper sulphate in a cold bath, and, after 10 turns in this, adding 2 lbs. of fustic extract 51°, previously dissolved in water, and raising the temperature to about 160° with constant turning. The yarn is then finished as usual.

For topping with oxidation aniline black, the yarn is dyed with about 4 lbs. of Melanogen Blue with the aid of salt and soda ash, then, rinsed and extracted. and, without further treatment, passed through the black liquor. The oxidation and finishing operation then proceeds as usual.

MELANOGEN BLUE B. ON WARPS.

As the main consideration in warp dyeing is an easy and satisfactory method, Melanogen Blue B is a color well adapted for the purpose of producing blues on warps fast to boiling with acid or soda. The best fixing agent for this purpose is Fixing salt M, or nickel sulfate. The warps are dyed in the ordinary warp dyeing machine and are passed once or several times through the boxes, according to the size of the machine. The common winch may be used, and they also may be dyed in the ball in machines constructed for the purpose. With this is given a sketch of a warp dyeing machine, which is used practically and has given good results with this color.

As shown in the drawing, the apparatus is arranged so that the warps leave the dye liquor at the end of the machine from which they are started. They first run over a winch on rollers to the back part of the machine and then passed through the liquor box containing the dye liquor; next, through squeezed rollers, and, finally, laid down in a wagon. According to the depth of the shade required, two to four passages are given.

Then, the warps are rinsed in a similar or larger machine. and, lastly, developed, and, if required topped with basic colors. The box for the dye liquor holds about 100 gallons, is about 5 feet long, 18 inches deep, and 2 feet wide. When the operation is carried out in this way, two separate chains can be run at the same time. The speed of the machine is regulated so that 2,500 yards pass in about one hour.

For each 100 lbs. of warp—

3-8 lbs. Melanogen Blue B,

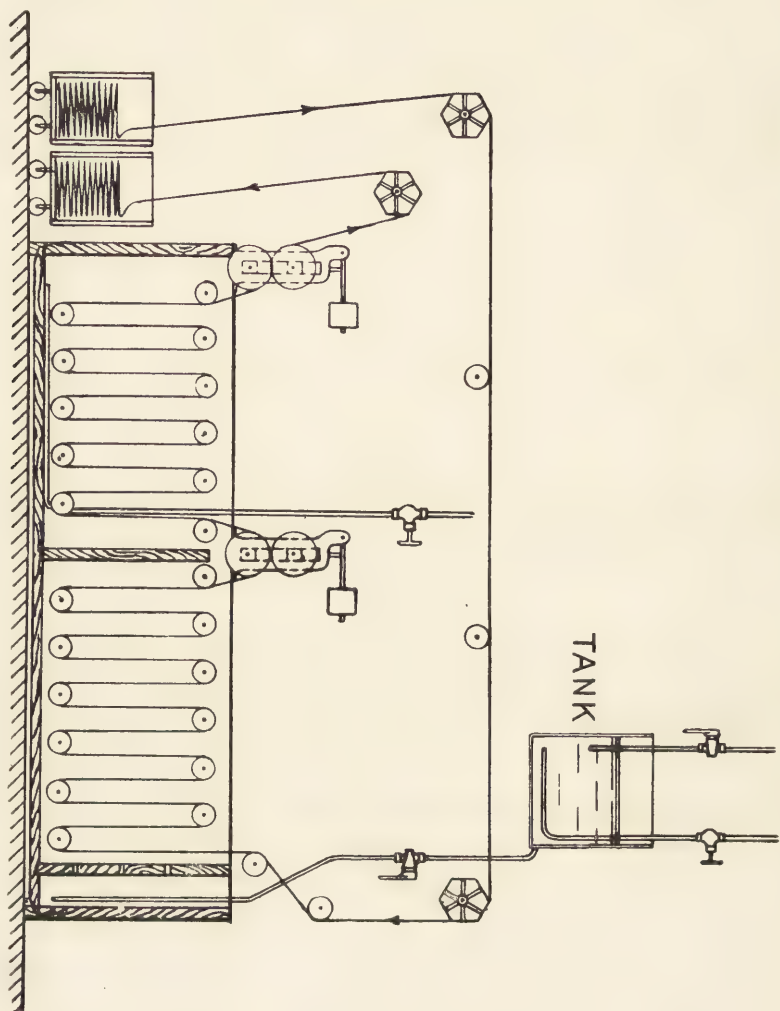
3-8 lbs. of soda ash, and for each gallon of liquor—

2-5 oz. calc. Glauber's salt.

The dyestuff is dissolved in the tank with the required amount of soda at 195°. Half the solution is run into the dye-bath which contains 2-3 of the quantity of Glauber's salt. Then, the tank containing half the dyestuff solution is again filled up and the last third of the Glauber's salt added to it. The machine is started and the dyestuff is run in gradually during the first two passages of the warp. After it is all in, two more runs are given. If the machine is run constantly and the old liquor used, the succeeding quantities of dyestuff, soda, etc., are reduced, and these are dissolved in the tank with some of the old dye liquor. The warps after dyeing are rinsed with plenty of water and are then ready for fixing. If the shades are dark, warm water should be used in the rinsing bath.

The fixing process is carried out by running the warps twice through the machine at 120°, which contains half the required metallic salt (2 to 3 lbs. of zinc sulfate, or whatever other salt may be required) and 2 lbs. of acetic acid—the remaining half is run in gradually during the operation. The material is then well washed.

For topping with basic colors, the warps are passed once or twice through the cold liquor containing the developing salt and the acetic acid. Then the basic dyestuff solution is gradually added during two more runs. The temperature is





then raised to 120°, and two more runs given. The warps are then finished in the usual way by soaping or sizing. The size may be slightly alkaline.

For grounding warps for after-dyeing in the indigo vat, this color is especially satisfactory, for it produces bright shades which are cheap and fast, and it also keeps the vats clean. The warps are grounded in the machine with 2 to 4 lbs. of blue and the usual additions; two to three runs are given in the warp-dyeing machine, and the warps are then rinsed and topped as usual in the vat. If possible, they should be first run in a dilute vat, and then in one that is more concentrated. They are oxidized in the usual manner and, finally, soured. Developing with metallic salt is only necessary when large amounts, that is, over 4 lbs. of the dyestuff, are used as a bottom.

MELANOGEN BLUE B. PAT'D. ON PIECE GOODS.

For dyeing piece goods, on account of its excellent fastness to washing, acids, light and rubbing, Melanogen Blue B will find an extensive application for producing fast shades on cotton, linen, and half-linen goods of all kinds. Indigo shades and Navy Blues are made with Melanogen Blue B and topped, if necessary, with basic colors in the developing bath. The fastness is not affected by the latter if the quantity is not excessive. Green shades may be made by developing with copper sulfate and topping with fustic extract. These shades are very fast and are suitable for special work where fast greens are required. The dyeing operation is most favorably carried out in the ordinary jigger; they may also be dyed in the kettle. The results are very good as regards fastness and the pieces do not show bronzy lists.

BLUE SHADES: In piece dyeing, the method is similar to that of yarn dyeing, but Glauber's salt should be used in the

dyebath. The temperature of the dyebath is kept at from 175° to 185°. This temperature is the most favorable for producing bright shades.

100 lbs. of material require—

2-8 lbs. Melanogen Blue B,

2-8 lbs. Soda Ash,

1 1-2 to 4 1-2 ounces of Glauber's salt for 1 gal of dye liquor.

The jigger is started with one-half of the required amount of soda and Glauber's salt. The dyestuff, dissolved with the remainder of the soda, is then added, after filtering the solution, in several portions. After working for 15 minutes, the remainder of the Glauber's salt is added to the dyebath, and the goods dyed for one or two hours, according to the depth of the shade and the length of the run. The bath may be used and the quantities of dyestuff in the succeeding baths reduced. After dyeing, the material is thoroughly rinsed and then developed in a fresh bath, four ends are given in a cold bath containing acetic acid and the required amount of metallic salt, the filtered basic dyestuff is added in four portions and the temperature is raised to 120°, or higher, if necessary, to exhaust the color; the goods are finally rinsed and soaped as usual.

GREEN SHADES: The material is dyed in the same manner as for Blue, but the color is developed by first treating in a cold bath with 1-8 lbs. of copper sulfate, the goods are given four runs and the temperature raised to 120°; after this, 1-2 lbs. of fustic extract 51° are added to the fixing bath and the temperature raised during 4 more runs to 160°.

MELANOGEN BLUE B. PAT'D. ON YARN AND PIECE
GOODS.

On linen yarn, Melanogen Blue produces blues which are fast to washing, boiling, rubbing and mangling and leaves the lustre of the fiber unimpaired. As these blues are dyed below the boil, the linen threads do not become woolly. For this same reason, Melanogen Blue B is superior to indigo and alizarine blue, and as compared with diazotized blue gives fuller shades which are very fast to boiling. The green and black shades have similar advantages. For linen piece goods, the dyeing process is carried out in the same manner as for cotton pieces. The shades are cheap and are distinguished for their fastness. They crock considerably less than indigo blues, and are also fast to mangling. The green and black shades are also suitable for this class of material.

THIOGENE BROWN R.

DYEING DIRECTIONS:—This bath is made up with the re-

quired amount of color from 2-10 lbs. and 2-3 lbs. of soda, and 2-5 ozs. of common salt to a gallon of dyebath. The material is entered at 158°, worked up gradually to 195°, and the dyeing continued for one hour. After dyeing, the material is well washed and developed with either 2 lbs. of copper sulphate, or, 2 lbs. of bichromate of potash with 2 lbs. of acetic acid. The developing bath is started cold and worked up to about 150° within 20 minutes. The goods are then well rinsed and finished as usual. For shading purposes, small amounts of basic dye-stuffs can be added to the copper sulphate bath. In this case

the material is first worked in a cold fixing bath containing only the copper sulphate and acetic acid, the basic dyestuff being added in several portions and the temperature finally raised to 175°.

DYEING WITH ALIZARINE COLORS. The shades obtained with thiogene brown can be topped with alizarine dyestuffs. The brown is fixed with 2 lbs. of bichromate of potash, 2 lbs. of alum and 2 lbs. of acetic acid. After fixing, the dyestuff is rinsed and entered in a fresh bath containing 2 lbs. of acetic acid and the required amount of alizarine. The goods are worked cold for half an hour and then raised gradually to a boil during another half hour and boiled for 10 minutes. In this case basic dyestuffs may also be added to the alizarine bath. The dyebaths do not exhaust and therefore can be used again. By running a standing kettle, 10 to 15 per cent. of dyestuff may be saved.

SYNTHETIC INDIGO M L B FOR FERMENTATION VATS ON LOOSE WOOL. PIECES, ETC.

1: Soda Vat:

This kind of a vat is used to obtain the brightest possible shades of blue on loose wool and pieces. For a vat of 900 gallons the following proportions of materials are used:

- 6 lbs. Madder,
- 6 lbs. Syrup,
- 15 lbs. Wheat Bran,
- 15-30 lbs. Solvay Soda,
- 10-15 lbs. Indigo M L B 20 per cent. paste, or
- 2-3 lbs. Indigo 100 per cent. powder,
- 2 lbs. dissolved lime.

The vat is filled with water and the materials added as convenient, and while thoroughly stirring, the whole is warmed to 127° F. Then the vat is allowed to rest for one day. On the second day it is again heated to the same temperature. This is repeated on the next and following days until the solution is complete. The vat should never be heated higher than 127° F. and carefully stirred. Should the proper condition of the vat not appear on the fourth day, it might be hastened by hanging a sackful of bran in it which will assist the fermentation. When the vat is in proper condition (the solution should be light yellow) the fermentation should be stopped by stirring in some lime until the odor and color and a test sample show the proper appearance. In dyeing, the soda-vat with indigo M L B is handled exactly the same as with the natural indigo.

2: The Woad Vat:

This sort of a vat, in contrast with the soda vat, is principally used to color dark indigo blue shades. For a vat of 900 gallons the following is used:

- 60 lbs. Woad,
- 10 lbs. Madder,
- 20 lbs. Soda Crystals,
- 12 lbs. Syrup,
- 20 lbs. Wheat Bran,
- 20-30 lbs. Indigo M L B 20 per cent. paste, or
- 5-6 lbs. 100 per cent. powder,
- 3 lbs. lime.

The woad vat differs from the soda vat in having a smaller amount of soda, with the addition of woad, and principally that in place of heating to 127° F. this is heated to 167° F. The method of using this is exactly the same as a similar vat made up with natural indigo.

INDIGO M L B FOR HYDROSULPHITE VAT ON
LOOSE WOOL, PIECES, YARN AND SLUBBING.

The stock solutions for these vats are made up as follows:

1: Preparation of hydrosulphite solution—

A clean oil barrel (50 gallons capacity) is three-quarters filled with warm water 86° F. Then add 108 lbs. bisulphite 38° Bé., and with constant stirring 12 lbs. zinc dust (mixed quickly to paste with warm water) in the space of half an hour. Let stand one hour. Next 8 lbs. caustic soda 100 per cent. dissolved in a little water, is stirred in and the whole allowed to stand one hour. The clear hydrosulphite solution is ready for immediate use.

2: The preparation of the stock liquor—

40 lbs. Indigo M L B 20 per cent. paste, or 8 lbs. 100 per cent. powd.

4 lbs. Caustic Soda (100 per cent.).

These are mixed together in a clean oil barrel (50 gallons capacity) 20 to 40 lbs. water added and the whole warmed to 110 to 128°. Then to this, enough freshly-made hydrosulphite solution to fill the barrel is added, and with frequent stirring the whole is warmed to the same temperature, (110 to 120° F.) and allowed to stand for some time.

3: Dyeing vat—

The best method for this is described in the patented process for Indigo Base M L B I.

The results obtained by preparing the indigo hydrosulphite vat are generally good, but the finest results can be obtained by using the prepared Indigo Base M L B I.

INDIGO BASE M L B I FOR HYDROSULPHITE VATS ON
LOOSE WOOL, FOR MILITARY CLOTH, ETC.

Process Patented.

1: The necessary assistants are—

1. Indigo Base M L B I
2. Hydrosulphite (weakly alkaline reaction)
3. Lime solution 1:10 (freshly made)
4. Bisulphite solution 38° Be.
5. Ammonia
6. Alcoholic Phenol Phthalein solution (one-half per cent.)

2: Proportions for a vat for Medium Blue—

The tub should contain about 800 gallons of water warmed to 120° F. This is made slightly alkaline with 2 to 4 lbs. of ammonia; then 10 lbs. of lime solution, the necessary amount of hydrosulphite, and after this the Indigo M L B I. The vat is then stirred and the wool (about 60 lbs.) entered. Two men work the same for about 15 minutes. Then the wool is passed through squeeze rollers and oxidized in the air. The excess of liquor runs back into the bath. Then this wool is again worked in a vat without addition of indigo. By the second working the wool takes up considerably more indigo than first, and most shades can be obtained in two runs. If a very dark blue is desired, then in the second run 3 to 6 lbs. bisulphite are sprinkled on the wool during the operation. By this means nearly four-fifths of the indigo in the vat is fixed on the fiber. By practice it is easily known whether the bisulphite is necessary and how much is needed for the shade to be obtained.

FURTHER OPERATION OF THE VAT.

If, after dyeing a dark shade for which bisulphite is required, it is desired to make a light blue, the vat must first be corrected with the aid of ammonia. By means of phenol phthalein the liquor can easily be made slightly alkaline. For this test a beaker glass of the liquor is taken from the vat and from one to two drops added. Should a weak rose color appear which soon fades, the bath is in proper condition.

For further dyeing the necessary amount of Indigo Base M L B I and hydrosulphite are added to strengthen the vat, so that the shade can be obtained in one to two runs.

In running dark blues consecutively, it is necessary to neutralize the acid in the bath, as the alkali contained in the Indigo Base M L B I is sufficient.

After the third operation it is not necessary to add fresh lime solution.

INDIGO BASE M L B I FOR HYDROSULPHITE VAT ON
SLUBBING, ETC., AND DYEING MACHINES.

Process Patented.

The necessary materials are—

1. Indigo Base M L B I
2. Hydrosulphite (weak alkaline reaction)
3. Lime solution 1:10 (freshly made)
4. Bisulphite 38° Be.
5. Ammonia
6. Alcoholic Phenol Phthalein solution (one-half per cent.)

METHOD FOR COLORING A MEDIUM BLUE.

The dyeing machine contains about 800 gallons water heated to 120° F., made alkaline with 2 to 4 lbs. of ammonia. To this 10 lbs. of lime solution are added, the necessary hydrosulphite and 20 to 30 lbs. Indigo Base M L B I, e. g., 20 to 30 lbs. hydrosulphite and 20 to 30 lbs. Indigo Base M L B I.

In this weakly alkaline dye liquor the slubbing (100 to 200 lbs.) is entered, and the pump worked from 5 to 10 minutes, and then bisulphite is added until blue litmus paper is slightly reddened. By practical working it can be seen from the gradual lightening of the dye liquor how much bisulphite is needed to fix nearly four-fifths of the indigo in the vat on the fiber. Usually 8 to 12 lbs. bisulphite are used. These are diluted with some water and fed through the feed box.

Altogether the dyeing operation consumes from 20 minutes to a half hour. Then the dipped slubbing is oxidized as quickly as possible, which can be done best with cold water.

FURTHER WORKING OF THE BATH.

To the bath again it is necessary that it should be made weakly alkaline by the addition of ammonia. By the aid of phenol phthalein reagent this can be done easily and quickly. To a beaker glassful of the liquor one to two drops of phenol phthalein is taken. Should no red color show too little ammonia has been used. If a weak rose color appears, fading immediately, then the liquor is in proper condition for further dyeing. The necessary amount of hydrosulphite and Indigo Base M L B I added and the dyeing carried out as at first. After the third operation no further addition of lime solution is needed.

FOR COLORING VERY LIGHT INDIGO SHADES, KNOWN AS PEARLS.

In coloring light indigo shades it is not necessary during the dyeing to use bisulphite. They are best worked in a weak alkaline vat.

INDIGO VATS FOR COTTON DYEING.

COPPERAS VAT.

With this vat the indigo is often directly reduced in the dye vat, but by the preparation of a stock liquor the indigo is reduced much quicker and better. The reduction requires about five hours. It is advisable to make up the stock liquor in the evening and let it stand over night, then it can be used the next morning. The amount of reducing agents necessary on the average, are as follows:

5 lbs. Indigo 20 per cent., or 1 lb. Indigo
M L B powder
3 lbs. Copperas
6½ Lime.

The indigo is made into a paste and then to this is added the copperas dissolved in hot water. The whole is well stirred and then dissolved lime and sufficient water is added to make a thick paste of the mixture of indigo, lime and copperas, and allowed to stand until the reduction is completed.

The stock liquor should be kept at a temperature of from 110° to 120°. It should not be allowed to fall below 110°, as in this case the operation proceeds very slowly.

COLOR VAT:

The vats are either round or square, made of wood or stone with cement joints, 4 to 5½ ft. across. For easier working, these vats are often let down to the level of the floor.

A vat which contains 125 gallons of water is prepared before the addition of the stock liquor, by adding 1 lb. of copperas, 2 lbs. lime (both in solution) so that the oxygen which is dissolved in the water is neutralized.

ZINC DUST VAT.

This vat has the advantage over the copperas vat that it contains less sediment in which a smaller quantity of indigo can be lost. These vats are prepared with indigo zinc dust and lime. The tubs are similar to those used with copperas vat. The following proportions are used for reducing indigo:

Stock liquor—

1 lb. Indigo powder or 5 lbs., 20 per cent. M L B

1 lb.—1 lb. 3 ounces Zinc Dust with 20 lbs. water,
120°

2 lbs. 6 ozs.—3 lbs. 3 ozs. quick lime.

The indigo is made into a paste and then mixed with zinc dust, and after this dissolved lime is added. The liquor is allowed, after frequent stirring, to stand 5 or 6 hours.

COLOR VAT:

In a dye tub containing 125 gallons of water—

8 ozs. Zinc Dust

1 lb. Lime

are added. To this some iron filings are added to hasten the clearing of the vat. If the vat contains an excess of zinc dust the constant producing of the hydrogen gas stirs up the sedi-

ment and thus makes the vat cloudy and scummy. In case this condition does not disappear by constant stirring, some Indigo must be added to combine with the free hydrogen.

A zinc vat which is in good condition is like a copperas vat; it is clear and amber yellow, has good bloom and in stirring shows blue veins.

This is stirred up well and let stand for about one hour, then the proportion of stock liquor and allowed to stand 2 or 3 hours, and then the coloring can begin. The vat liquor should after standing appear brownish yellow, and on stirring show numerous dark blue veins. On the surface appears a dark blue scum, which before dyeing is taken off and added to the stock liquor.

If the dye liquor appears greenish it contains unreduced indigo. In this case copperas must be added. If it is dark, lime must be added. The exact proportions cannot be given, as the conditions of each vat are different and require more or less chemicals. It is necessary to be careful not to add too much of these. A vat that is too strong with lime dyes very slowly and when containing too much copperas will not yield fast colors. It is well to stir up the vat thoroughly every evening and make an addition of the stock liquor whenever necessary.

The yarn before coloring is boiled out with 3 to 5 per cent. calcined soda. When boiling under pressure less soda is required. Then the yarn is wrung and dyed as usual.

VIGOUREUX COLORS PRINTED ON SLUBBING.

During the year, the Farbwerke, vorm. Meister, Lucius & Bruening have brought out a new line of colors known as Vigoureux colors. These colors are fixed with chromium oxide, and produce shades, that as regards milling, finishing, acids and light, answer the requirements for printing, slubbing to be used in the manufacture of material for men's wear. The method of using is as follows:—

The weighed dyestuff is dissolved in boiling water in a wooden vessel and thickened with British gum; then acetic acid is added and the whole cooled down. When cold, sulphuric acid, fluoride of chrome, chlorate of soda and huile tour-nante are added. Fluoride of chrome is the best chromium mordant for the purpose. It is made into a paste with one-quarter of its weight of water in a wooden vessel before adding to the color paste, as it is injured by contact with glass, porcelain or metals. As some of these colors are somewhat sensitive to copper, it is advisable to add a little sulphocyanide of ammonia to the printing paste. The addition of the oil to the paste improves the consistency and has a very favorable action upon the handle of the wool.

The slubbing is steamed after printing while damp for two hours without pressure, but fuller shades are obtained if the material is first steamed for one hour, then allowed to stand for one hour and steamed again for one hour more. This method of steaming twice is especially advisable for shades containing Vigoureux yellow and Vigoureux brown. If possible, the steamed material should be allowed to lie over night which assists in developing the shades. They are finished in the ordinary way in the gill box. The formulas for the printing paste follow:—

BLACK.

500 parts Vigoureux black I patented,
5,220 parts hot water,
2,500 parts British gum,
500 parts Acetic acid 12° Tw.,
add cold—
400 parts diluted sulphuric acid,
(500 parts 168° Tw. in 1,000 parts)
500 parts Fluoride of chrome,
125 parts Water,
50 parts Chlorate of soda powder,
200 parts Tournant oil,
5 parts Sulphocyanide of ammonia crystals.

10,000 parts.

GREY.

500 parts Vigoureux grey I patented.
5,220 parts hot water,
2,500 parts British gum,
500 parts Acetic acid 12° Tw.,
add cold—
400 parts diluted sulphuric acid,
(500 parts 168° Tw. in 1,000 parts)
500 parts Fluoride of chrome,
125 parts Water,
50 parts Chlorate of soda powder,
200 parts Tournant oil,
5 parts Sulphocyanide of ammonia crystals.

10,000 parts.

YELLOW.

600 parts Vigoureux yellow I patented,
5,120 parts hot water,
500 parts Acetic acid 12° Tw.,
2,500 parts British gum,
add cold—
500 parts diluted sulphuric acid,
(500 parts 168° Tw. in 1,000 parts)
500 parts Fluoride of chrome,
125 parts Water,
50 parts Chlorate of soda powder,
200 parts Tournant oil.
5 parts Sulphocyanide of ammonia crystals.

10,000 parts.

BLUE I.

2,500 parts British gum,
4,900 parts Water,
add cold—
1,500 parts Alizarine blue S 2 R paste,
600 parts Fluoride of chrome,
150 parts Water,
150 parts Tartaric acid powder,
200 parts Tournant oil,

10,000 parts.

BROWN.

500 parts Vigoureux brown I patented,
 5,220 parts hot water,
 500 parts Acetic acid 12° Tw.,
 2,500 parts British gum,
 add cold—
 400 parts diluted sulphuric acid,
 (500 parts 168° Tw. in 1,000 parts)
 500 parts Fluoride of chrome,
 125 parts Water,
 50 parts Chlorate of soda powder,
 200 parts Tournant oil,
 5 parts Sulphocyanide of ammonia crystals.

10,000 parts.

RED.

500 parts Vigoureux red I patented,
 5,220 parts hot water,
 2,500 parts British gum,
 500 parts Acetic acid 12° Tw.,
 add cold—
 400 parts diluted sulphuric acid,
 (500 parts 168° Tw. in 1,000 parts)
 500 parts Fluoride of chrome,
 125 parts Water,
 50 parts Chlorate of soda powder,
 200 parts Tournant oil,
 5 parts Sulphocyanide of ammonia crystals

10,000 parts.

JET BLACK.

500 parts Vigoureux black I patented,
100 parts Vigoureux yellow I patented,
4,900 parts Hot water,
500 parts Acetic acid 12° Tw.,
2,500 parts British gum,
add cold—
500 parts diluted sulphuric acid,
(500 parts 168° Tw. in 1,000 parts)
600 parts Fluoride of chrome,
150 parts Water,
50 parts Chlorate of soda powder,
200 parts Tournant oil,
5 parts Sulphocyanide of ammonia crystals.

10,000 parts.

BLUE II.

150 parts Patent blue A.
4,750 parts Boiling water,
2,500 parts British gum,
add cold—
1,500 parts Alizarine blue S 2 R paste,
600 parts Fluoride of chrome,
150 parts Water,
150 parts Tartaric acid powder.
200 parts Tournant oil.

10,000 parts.

DISCHARGE ON MELANOGEN BLUE B TOPPED WITH
VICTORIA BLUE B.

The goods are dyed on the jigger in the usual way. It is advisable to use Glauber's salt in the dyebath instead of common salt. The proportions for the bath are:—

5 lbs. Melanogen Blue B,
2 lbs. Soda Ash.

and Glauber's salt at the rate of $2\frac{1}{2}$ ounces to the gallon of dyebath. The amount of water used should not exceed 20 times the weight of the cloth. The jigger is prepared with half the required amount of soda and Glauber's salt. The dyestuff is dissolved with the remainder of the soda and added after filtering in several portions. After working for a quarter hour, the second half of the Glauber's salt is added to the bath, and the goods dyed at 170° F., until the shade is obtained. After dyeing, the goods are rinsed twice in warm water and topped with the following proportions:—

Alum, 4 lbs.
Acetic acid 12° Tw. 2 parts,
Victoria Blue B 5 ounces.

The goods are run four times through the cold bath containing the alum and the acetic acid. The dyestuff is dissolved and strained and added in four portions, and the temperature is then raised to 125° F., and the goods are run until the bath is exhausted. The goods are then printed with either of the following discharges:—

DISCHARGE COLOR I.

- 3 gallons No. 11 gum,
 $\frac{1}{2}$ gallon water,
5 pounds Chlorate of potash,
6 pounds Chlorate of soda,
boil and when cool, add—
6 pounds Citric acid.
Before use, add the solution of—
2 pounds Red prussiate of potash in—
4 parts water.

DISCHARGE COLOR II.

- $5\frac{1}{2}$ pounds British gum made into a paste with—
 $1\frac{1}{4}$ pounds water and—
 $12\frac{1}{2}$ pounds Chlorate of alumina 42° Tw., and slightly
heated on the water bath; then—
 $3\frac{3}{4}$ pounds Chlorate of soda and—
 $\frac{1}{2}$ pound Prussiate are added cold.
Chlorate of Alumina.

Mix the solution of 20 lbs. sulphate of alumina in 13 lbs. hot water and 30 lbs. chlorate of barium crystals in 35 lbs. boiling water. Allow to settle, use the liquor clear.

After printing, age 3 minutes, soap slightly, or, better, pass through a weak solution of soda.

ALIZARINE BLUE RESIST.

A steam alizarine blue color containing bisulphites of chromium and sodium serves as a resist for paranitraniline red, and in this way fast blue patterns may be produced on a red ground. After padding with alkaline beta naphthol the goods are dried in the hot flue and printed with the above-mentioned resist and suitably thickened. They are next passed through the ageing machine, after which the red is developed in the ordinary diazo bath; finally the pieces are aired, washed, soaped and washed again. Certain dyestuffs which require after-chroming may be mixed with, or substituted for, the alizarine blue. In this case the pieces are chromed after the airing which follows the development of the red; this chroming does not affect the red. The blue produced in this manner is very fast, and is not injured by boiling with soap for from 1 to 1½ hours.

When blue and white on red are required, a resist containing potassium sulphite is printed in addition to the alizarine blue resist. If the pieces are topped with a direct pink dyestuff, such as diamine rose, the red approaches a Turkey red in tone and the blue becomes fuller and brighter. This topping is carried out in the jigger at 80° C., in a dye solution containing two grm. per litre. In place of the bisulphites of chromium and sodium, potassium sulphite and chromium acetate may be employed, or potassium sulphite and chromium sulphite. These two mixtures possess the advantage that they do not give off sulphur dioxide, a gas which is very injurious to paranitraniline red. Most of the dyestuffs which are capable of being fixed by means of chromium can be similarly employed for resists under paranitraniline red. From certain other dyestuffs a colored resist can be prepared containing sodium bisulphite, together with an appropriate mordant. A variety of effects in imitation of Turkey red discharge styles may be produced in fast colors in one or other of these ways.—*Textile Mercury*.

SUBSTITUTION OF GELATINE FOR ALBUMEN.

In the preparation of a number of calico printers' colors it may be found desirable to substitute gelatine for the formerly much-used albumen. Gelatine in the form of the ordinary commercial glue of average quality is suggested for use. It has been found that compounds of copper, iron, and manganese, as well as tannate of zinc, dulled the shades, while carbonate of magnesia gradually thickened the printing color and ended by coagulating it. Caustic alkalies, however, had no fixing action. The best results were obtained with acetate of zinc.

Printing colors were prepared with gelatine, and this salt kept very well in a cool place, and could be fixed completely by a stay of five minutes in the Mather-Platt machine. This circumstance enabled the production of reserves on aniline black which are generally obtained with the use of albumen.

The reserve thickening used had the following composition:—

Glue	25 lbs.
Zinc acetate (cryst.)	10 lbs.
Sodium acetate (cryst.)	15 lbs.
Oleine	20 lbs.

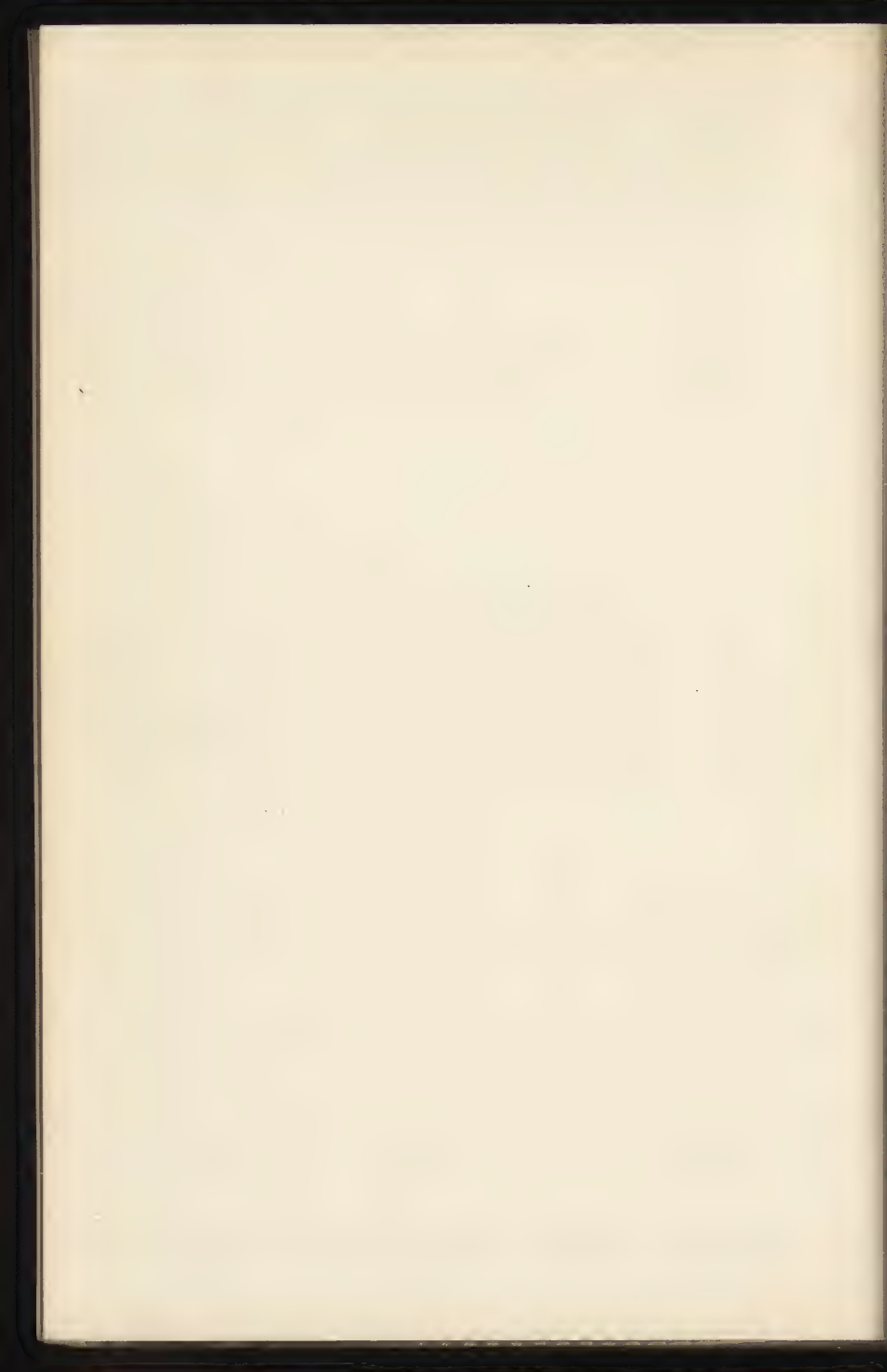
The use of oleine, or indeed, of any other vegetable or mineral oil, much improves the vividness and fastness of the colors.

The glue above mentioned is made by boiling dry gelatine with its own weight of 12 per cent. gum tragacanth mucilage for 6 hours.

The colors are obtained much more cheaply with gelatine than with albumen, but, unfortunately, the colors containing the latter are very much faster—*Textile Record*.



PART V.
EDUCATIONAL.



EDUCATIONAL.

Chemical Instruction and Industries in Germany.

The British consul at Stuttgart has recently made a report upon the chemical schools of Germany, in which he says that at first the German universities were situated in small provincial towns. These institutions commenced to devote attention to chemical technology about the middle of the 17th century, and which may be said to have laid the foundation of the German chemical industry of the present day.

The advance in industries and trade, however, rendered the creation of special technical schools necessary, and these were accordingly established, at first as polytechnic schools, and afterwards as technical high schools. They were founded during the nineteenth century, and are situated—with the sole exception of Aachen—in large towns or in capitals of States.

At the time of their foundation they were principally intended for the study of architecture, engineering, and mechanical technology. Since then the study of chemistry has been greatly developed and specialized, and various other courses have been added, such as forestry, surveying, electricity, photography, naval architecture, and pharmacy.

The study of pure and technical chemistry and technology was, during this time, by no means neglected at the other German universities. The first public chemical laboratories for the general use of students were opened at Gottingen in 1809 by Prof. Strohmeyer, and at Giessen in 1827 by Dr. Justus von Liebig.

The opening of these public laboratories forms an important epoch in the development of chemical instruction in Germany. During the winter term of 1841 no less than 50 students of chemistry were working in Liebig's laboratory. His example soon found imitators and adherents, and at the present time nearly all the German universities are equipped with more or less perfect chemical laboratories and staffs of professors, lecturers, and trained assistants.

It has not been found necessary for the purposes of this report to mention the details of study in the chemical departments of the schools, as their courses of study are specialized according to their various needs: Mining academies, agricultural colleges, veterinary high schools, forestry academies, building and engineering schools, military technical academies, industrial schools, special technical schools, and trades' schools.

As at other universities, students are not required to attend all lectures, but only those which concern their special branch or branches of chemistry. All the remaining time is devoted to practical work in the various laboratories.

Generally speaking, the fees are somewhat higher than at the technical high schools. The fees for the Berlin University are \$29 per term for chemical laboratory, and \$24 for lectures. For the majority of German universities \$24 for laboratory work, and \$15 to \$19 for lectures may be assumed as a fair average per term.

The following is a fair estimate of expenditure for the study of chemistry per annum:—

Expenditures for One Term.

Eight courses of lectures of one hour each at \$1.00 per	
lecture	\$8.00
Additional lectures	2.50
Chemical laboratory	20.50
Apparatus, chemicals, books, etc.	12.00
<hr/>	
Total	\$43.00

For the whole year it gives \$86.00. This estimate refers particularly to the Berlin Technical High School, and might be easily reduced to \$73 for Hanover and Aachen and the non-Prussian technical schools. For this small amount the finest instruction and the best equipped laboratories are open to the German student. Annual expenditure for living is estimated at \$365.

According to Professor Fischer, Germany possessed in the year 1897, 4,000 thoroughly-trained chemists who had passed through the full courses of the universities or technical high schools. The number for the present year may be estimated at 4,500.

This estimate applies to chemists residing in Germany; the number of German chemists in foreign countries ranges probably from 700 to 1,000; it does not include, further, professors, lecturers, and assistants at universities, technical high schools, etc., and private chemists.

Chemical industrial circles in Germany are by no means satisfied with the great progress and measure of success already attained, and are actively endeavoring not only to maintain but to increase the present facilities for technical education.

A visible result of the success of their efforts is shown by the decision of the Prussian Government to erect two new technical high schools in Prussia—at Dantzic and Breslau. The Dantzic school is also in process of erection, and will devote special attention to the study of naval architecture and engineering, for which subjects the facilities hitherto afforded have been extremely inadequate. It will for the present be equipped for 700 to 800 students. The annual financial contribution of the Prussian State will amount to \$90,000, and the cost of erection to \$1,000,000, without taking into account the further expenditure for internal fittings, apparatus, machines, collections, etc.

**Department of Chemistry and Dyeing of the
Philadelphia Textile School, Pennsylvania
Museum and School of Industrial Art.**

The general course of instruction pursued by this department extends over a period of two years, and is especially designed for giving a scientific technical education to those who desire to embrace in their profession these branches of industrial technology. The primary aim of the school is to give those who intend entering upon a career in the dyeing and textile industries a sound elementary knowledge of the sciences especially of the general chemistry which underlies these industries, and to train them to apply their knowledge with advantage and success.

A knowledge of chemistry is coming to be recognized more and more as a necessary adjunct in nearly every technical profession and craft, and especially is this true with reference to textile manufacture, where a considerable insight into the phenomena of chemical processes must go hand in hand with a comprehensive understanding of the dyer's art. The old-time methods of "finger and thumb" are being replaced by scientific processes, the inner workings of which are only understood by the practiced chemist. The much-spoken "secrets" of the dyer, formerly so jealously guarded by the

holder, and considered as the deepest of mysteries by the ignorant, have been subjected to the scientific scrutiny of the chemist, and have become matters of accurate knowledge, and when the experience of the man whose training has been mostly received in the practical duties of the dye-house is supplemented by this accurate information his mastery of the craft in question becomes indisputable. The chemical courses in this department are ordered with reference to giving the student a scientific as well as a practical insight into the phenomena to which he is to devote his attention. A study of the materials and the processes is carried on with special reference to this end. The student is made thoroughly acquainted with the chemical nature of the various fibres which he is to handle, the effect on them of the numerous chemicals and dyestuffs with which they are to be treated, and the methods of testing them with reference to the special uses for which they are intended.

Dyeing is an art immediately associated with chemistry, and is one of the chief ramifications of that fundamental science. As an art it has long been practiced, but it is only of late years that scientific methods have been introduced into this study; and through this means of development it is rapidly assuming a position in the front ranks of applied science. The chemist recognizes it as one of the widest and most lucrative branches of his profession, and by carrying into it a clear conception of the nature, composition and action of the various textile fibres, together with a knowledge of the chemical character and behavior of metallic salts and dyestuffs, he is in a position to deduce scientific results from a collection of crude facts, which in the early stages of the art were clouded by misapprehension and secrecy. The "art" of dyeing is more and more becoming the "science" of dyeing, and results which have been obtained through chance and blind experiment have been reduced to the certainty of scientific knowledge. He who knows the why and wherefore of his art will always outclass the ignorant workman, both in the success of his work and in the development

of his profession. The intelligent dyer will use his brains quite as much as his book of formulas.

The whole study of dyeing in this school is carried on with the idea of inculcating into the mind of the student a scientific conception of what he is doing; he is taught to experiment in an intelligent manner—not to take things for granted, but to know the reason why. And, moreover, his experiments are not limited to the laboratory pot and kettle, where results are too often deluding, but the student carries on his dyeing in a manner that enables him to encounter and overcome the petty difficulties and changing conditions of the mill and dye-house.

The higher branches of chemistry, which follow a thorough training in the elementary courses, are chosen with special reference to the individual needs of the students. The technical analysis and valuation of commercial products is given especial attention, and a high standard in manipulative skill and accuracy in experimental work is insisted upon, for it is such training which fits the student for accurate and scientific results in after years, when he is called upon to make a practical application of his knowledge in an intelligent and skillful manner.

EQUIPMENT.

The department is furnished with the necessary laboratories and appliances needful in the prosecution of experimental studies, in both chemistry and dyeing. The instruction in dyeing is not only carried on experimentally in the laboratory, but a more practical knowledge is derived from the use of the larger machinery in the dye-house, which the school-house possesses in a well-equipped manner.

DESCRIPTION AND SYLLABUS OF COURSES.

Chemistry I.—General Inorganic. The general properties of matter.—Simple and compound bodies.—Laws of chemical combination.—Elements, atoms and molecules.—The atomic theory.—Chemical calculations.—Preparation, classification and chemical behavior of the chief elements and their compounds, comprising the non-metals and metals, with special reference to those of commercial importance.

Chemistry II.—Qualitative Analysis. The analytical classification of metals.—Characteristic tests for the different elements.—Detection of bases and acids in their compounds.—Solving of analytical problems.—Writing of reactions and calculation of results.—Laboratory practice in the manipulation of experiments and the handling of analytical apparatus.

Chemistry III.—Quantitative Analysis. Use of the balance and other apparatus.—Precipitation, filtration and weighing.—Gravimetric analysis of simple salts and materials used in the manufacture of textiles.—Quantitative separations and determination of the metals.—Volumetric analysis.—Preparation and standardization of solutions.—Use of indicators.—Use and calibration of graduated apparatus.—Acidimetry and alkalimetry.—Calculation of results.

Chemistry IV.—General properties of the compounds of carbon.—Recognition and estimation of carbon, hydrogen, oxygen, nitrogen, the halogens, sulphur and phosphorus in organic bodies.—Calculation of percentage composition and determination of molecular formulae.—Study of typical compounds; the hydrocarbons, alcohols and acids.—Organic radicals.—The aliphatic and aromatic series.—Benzene and its derivatives.—Phenol and aniline products and dyestuffs.—Anthracene and alizarine products.—The alkaloids.

Chemistry V.—Technical Analysis. The preparation, properties and analysis of acids and alkalies, bleaching agents, soaps, oils, tannins, mordants and dyestuffs.—Commercial valuation.—Analysis of water and the more important substances used in the technical arts.

Chemistry VI.—Coal Tar Colors. The manufacture of coal gas.—Composition of coal tar.—Fractional distillation.—Isolation and purification of intermediate products.—Manufacture of nitro-benzene, aniline, diphenylamine, the naphthols and naphthylamines and other raw materials used in the preparation of the coal tar colors.—The aniline dyes.—The phenol dyestuffs; nitro- and azo-bodies.—Oxyazo dyes.—Anthracene derivatives. New dyes.

Dyeing I.—Elementary Course. Chemical technology of the textile fibers.—Wool, silk, cotton, linen, etc.—Preparation of fibers for dyeing.—Scouring, bleaching and boiling off.—Action of chemical agents.—General methods of dyeing animal and vegetable fibers.—Theories of dyeing.—Application of the different classes of dyestuffs; natural and artificial; acid and basic; substantive and adjective.—Mordants and their application to animal and vegetable fibers.

Dyeing II.—Intermediate Course. Coloring studies in dyeing.—Shade matching on different fibers and materials.—Production of fast colors.—Special process of dyeing.—Dyeing of shoddy, mohair, ramie, linen and other textile fibers.—Chlored wool.—Studies in diazotizing and coupling processes. Application of new dyestuffs.

Dyeing III.—Advanced Course. Advanced methods of scouring, carbonizing and dyeing.—Matching shades on yarns and fabrics.—Indigo vat dyeing.—Turkey red.—Alizarine shade matching.—Aniline black.—Silk dyeing; study of the fiber and the action of chemicals and dyestuffs.—Machinery used in the various processes of dyeing, scouring and bleaching.

Dyeing IV.—Testing and Valuation of Dyestuffs. Testing colors as to permanence against the action of light, scouring and fulling. Determination of commercial value of dyewares, mordants, bleaching agents, scouring agents, etc.—Purification of spent liquors and recovery of waste products.—Detection of dyestuffs on fibers and otherwise.—Detection of the different fibers in mixed goods.

EVENING CLASSES.

In order to allow dyers and others employed during the day to receive some of the benefits and profit by the facilities for study which this school may afford, courses in chemistry and dyeing have been arranged to be carried on in the evening. An attempt is made to bring the lectures and laboratory work down to the every-day needs of the practical dyer, and they are more in the form of familiar talks on the subjects in which he is interested than abstruse scientific lectures. The courses are planned with the view of affording the practical man an opportunity of gaining an elementary scientific education, making him acquainted with up-to-date ideas and methods, and enlarging the sphere of his usefulness by extending the knowledge of his art. The courses extend over a period of three years, during which time instruction is given in a practical way in elementary, intermediate and advanced dyeing. Elementary chemistry is taught by means of lectures and laboratory work, and the student is given an idea of the chemical workings of the processes he is daily carrying into operation.

The courses in dyeing are modelled on those given to the day students; the limited time, however, at the disposal of the evening classes will not permit, of course, of such elaboration either in the lectures or experiments, but practically the same ground will be covered in wool and cotton dyeing.

Besides the general course in elementary chemistry, there is also offered one in more advanced chemistry, open to students who give satisfactory evidence of having already attained sufficient ground work in general chemical knowledge to be able to pursue such studies with profit and understanding. This course is one in technical analysis, and the character of the subjects taken up has a direct bearing on the needs of the individual student, who is given the opportunity to devote his attention almost exclusively to that line of chemical investigation in which he is personally interested. After a brief course in the fundamental and essential principles of qualitative and quantitative analysis in general, the student proceeds to his specialized subject, and enters into the investigation and analysis of particular chemical products under the personal supervision and direction of the teacher. A well-equipped laboratory, with all the necessary analytical apparatus and reagents, affords the student every opportunity for accurate and scientific work. The course is designed for the purpose of extending to those employed in the various trades an opportunity of advancing both themselves and their profession by becoming acquainted with the special chemistry of their subject. An endeavor is made to give such persons both the knowledge and the ability necessary to analyze the raw materials and products of manufacture involved in their separate industries.

FEEES AND DEPOSITS.

The tuition fee for the Day Course in Chemistry and Dyeing is \$150.00 per school year of thirty-six weeks. All students taking this course are charged a laboratory fee of \$5.00, and in addition are required to deposit \$15.00 to cover breakage of chemical apparatus or other damage to school property. After deducting the sum chargeable to the above accounts the balance is returned at the close of the school year. Students of the day school also make a deposit of \$2.00 for a locker key,

of which amount, 50 cents is refunded upon the return of the key, the balance being retained as rental for the use of the locker. Keys will not be redeemed unless presented within thirty days after the close of the school year.

The tuition fee for the Evening Course in Elementary Chemistry or in Dyeing is \$15.00 for the term of twenty-five weeks. In addition to this each student in the Chemical Course is required to make a deposit of \$10.00, and each student in the Dyeing Course \$5.00, to cover breakage of chemical apparatus and laboratory charges. After deducting these amounts the balance is returned at the end of the school year.

The tuition fee for the Evening Course in Technical Chemistry is \$25.00, and each student is required to deposit \$10.00 to cover breakage of chemical apparatus and laboratory charges. After deducting these amounts the balance is returned at the end of the school year.

All students of the Evening School make a deposit of \$1.00 when they are supplied with a locker. Fifty cents of this amount is refunded, provided the key is returned within thirty days after the close of the school year.

Lowell Textile School.

Within a few weeks the Lowell Textile School will occupy Southwick Hall, the first of a series of new buildings, now under process of construction.

This new building, which is illustrated by accompanying cut, is beautifully located on the banks of the Merrimack, but a short distance below the famous Pawtucket Falls.

The work of the whole school will be much improved and broadened upon the occupation of these new buildings, but in no department will the change be more marked and the work facilitated to a greater extent than in that of Chemistry and Dyeing. Modern machinery for illustrating the various processes of textile coloring on the practical scale will be introduced, and every effort will be made to keep the appointments and equipment of the laboratories as well as the courses of study, of a thoroughness and grade second to none in the world.



SOUTHWICK HALL.



BOOKS FOR THE YEAR.

English and American.

THE DYEING OF COTTON FABRICS.

By Franklin Beech.

Publishers, D. Van Nostrand & Co., New York, 1901.

THE DETECTION OF ANILINES, ALIZARINES, WOOD COLORS, ETC., ON THE FIBER.

By Frank L. Horrocks.

Publishers, Dyer's Journal Publishing Co., Philadelphia, 1901.

Distributed by Victor Koechl & Co.

A DICTIONARY OF DYES, MORDANTS AND OTHER COMPOUNDS USED IN DYEING AND CALICO PRINTING.

By Rawson, Gardner and Laycock.

Publishers, J. B. Lippincott Co., Philadelphia; C. Griffin & Co.
Ltd., London, 1901.

Foreign.

CHEMIE DER ORGANISCHEN FARBSTOFFE.

Dr. Rudolf Nietski.

Vierte vermehrte Auflage.

Berlin, 1901, Verlag von Julius Springer.

VICTOR JOCLÉTS CHEMISCHE BEARBEITUNG DER SCHAFWOLLE.

W. Zänker.

Zweite Auflage.

Wien, Pest, Leipzig, 1901, A. Hartleben's Verlag.

HANDBUCH DER FAERBEREI DER SPINNFASERN.

Dr. R. Loewenthal, Dr. E. Knecht und Chr. Rawson.

Zweite Auflage.

Berlin, 1900, Verlag W. und S. Loewenthal.

JAHRBUCH DER CHEMIE.

X. Jahrgang, 1900.

Braunschweig, Friedrich Vieweg & Sohn, 1901.

DER FORMALDEHYD, SEINE DARSTELLUNG UND EIGENSCHAFTEN, SEINE ANWENDUNG IN DER TECHNIK UND MEDICIN.

Dr. L. Vanino und Dr. E. Seitter.

Wien, Pest Leipzig, A. Hartleben's Verlag, 1901.

PRAKTISCHES HANDBUCH DES ZEUGDRUCKS.

Dr. Eduard Lauber.

Erster Band Vierte Auflage.

Leipzig, 1901.

DAS LICHT UND DIE FARBE. SECHS VORLESUNGEN.
GEHALTEN IM VOLKSHOCHSCHULVEREIN
MUENCHEN.

Prof. Dr. Leo Graetz.

Leipzig, Verlag von B. G. Teubner.

DIE CHEMIE DES STEINKOHLENTHEERS.

Dr. Gustav Schultz.

Dritte, Vollständig Umgearbeitete Auflage.

2. Band: Die Farbstoffe.

Braunschweig, Verlag von Friedrich Vieweg & Sohn, 1901.

DIE ANIMALISCHEN FASERSTOFFE.

Max Böttler.

Wien, Pest, Leipzig, A. Hartleben's Verlag, 1901.

DIE ORGANISCHEN FARBSTOFFE THIERISCHEN UND
PFLANZLICHEN URSPRUNGES UND DEREN
ANWENDUNG IN DER FAERBEREI UND
ZEUGDRUCKEREI.

Albert Berghoff.

Wien, Pest, Leipzig, A. Hartleben's Verlag, 1901.

268 YEAR BOOK FOR COLORISTS AND DYERS.

AUSGEWAEHLTE METHODEN DER ANALYTISCHEN
CHEMIE.

Erster Band.

Prof. Dr. A. Classen unter Mitwirkung von H. Cloeren.
Braunschweig, 1901, Verlag von Friedrich Vieweg & Sohn.

TEXTILCHEMISCHES VORSCHRIFTENBUCH FUER
DIE GESAMMTE TEXTIL INDUSTRIE.

Siegfried Eisenstein.

Wien, 1901.

CAPILLARANALYSE, BERUHEND AUF CAPILLARI-
TAETS—UND ADSORPTIONS—ERSCHEINUNGEN,
MIT DEM SCHLUSSKAPITEL; DAS EMPOR-
STEIGEN DER FARBSTOFFE IN DEN
PFLANZEN.

Friedrich Goppelsroeder.

Basel, 1901, Buchdruckerei Emil Birkhäuser.

PART VI.

LIST OF DYESTUFFS,
MAKERS AND
METHODS.



LIST OF DYESTUFFS, MAKERS AND METHODS.

(Abbreviations Used to Indicate the Dyestuff Manufacturers
and Their Agents.)

(A) Berlin Aniline Works, 72 Front St., New York; 124 Pearl St., Boston; 122 Walnut St., Philadelphia.

(A A C) American Color & Chemical Co., Albany, N. Y.
Agent (At).

(A C) Anchor Color Mfg. Co., 462 Cherry St., New York.

(A M) Actiengesellschaft für Chemische Industrie, Mannheim, Germany.

(Ash) T. C. Ashley & Co., 145 Milk St., Boston.

(At) F. E. Atteaux & Co., 174-176 Purchase St., Boston; 176 Fulton St., New York; 17 Kinzie St., Chicago; West Fulton St., Gloversville, N. Y.; 53 Colborne St., Toronto, Ontario; 15 Lemoine St., Montreal, P. Q.

(B) Badische Anilin und Sodafabrik, Ludwigshafen am Rhein, Germany. Agent (P K).

(B A Co.) British Alizarine Co., Ltd., Silvertown, Victoria Docks, London, England. Agent (Bch).

(Bai) Bairstow & Co., 211 Pearl St., New York.

(B C F) Chemische Fabrik, Bindschedler, Basle, Switzerland.

(Bch) Beach & Co., Hartford, Conn. Agents for (B A Co.).
(Br S), (E F W), (Grie) and (Rh).

(Bd) J. A. & W. Bird & Co., 43 Cedar St., New York.
Agents for (ClCo) and (LD).

(B E) C. vom Bauer, Elberfeld, Germany.

(B K) Leipsiger Anilinfabrik Beyer und Kegel, Leipzig,
Germany. (Closed).

(B L) Bosson & Lane, 36 Central Wharf, Boston, Mass.

(Bt) F. Bredt & Co., 194 Fulton St., New York; 12 S. Front
St., Philadelphia. Agents for (K B).

(Br S) Brooke, Simpson & Spiller, Ltd., Hackney Wick,
London, England. Agents (Bch).

(Bs) C. Bischoff & Co., 87-89 Park Place, New York, 151
South Front St., Philadelphia; 124-126 Purchase St., Boston;
10 Weybosset St., Providence. Agents for (D) and (L).

(By) Farbenfabriken, vormals Fried. Bayer und Co., Elber-
feld, Germany; 40 Stone St., New York; 32 India St., Boston;
13 N. Water St., Philadelphia; 189 Kinzie St., Chicago. Agent
for (H R W).

(C) Leopold Cassella & Co., Frankfort-am-Main, Germany.
Agent (Math).

(C D C) Central Dyestuff and Chemical Co., Plum Point
Lane, Newark, New Jersey.

(Cl Co) The Clayton Aniline Co., Ltd., Clayton, Manchester,
England. Agent (Bd).

(C J) Carl Jäger, Barmen, Germany.

(C R) Claus & Rée, Droylsden, Manchester, England.

(C V) Colne Vale Chemical Co., Milnsbridge, Huddersfield, England.

(Cz) John Casthelaz, Bruère & Co., Belbeuf, Rouen, France.

(D) Farbenfabrik Dahl & Co., Barmen, Elberfeld, Germany.
Agents (Bs).

(D H) Durand, Huguenin & Co., Basle, St. Fons and Hünningen. Agent (Klp).

(D W) L. Destree, A. Wiescher & Co., Haeren near Brussels, Belgium.

(E. H) E. de Haen, List, near Hannover, Germany.

(E F W) Elton Fold Works, Bury, Lancashire, England.
Agent (Bch).

(F) Farbwerk Friedrichsfeld, Mannheim, Germany.

(F G B) F. G. Brown, 112 N. Delaware Ave., Philadelphia.

(Fi) Alfred Fischesser & Co., Muhlhausen, Elsass, Germany.

(F T M) Fabriques de Produits Chimiques de Thann et de Mulhouse, Alsace, Germany.

(G) Joh, Rud. Geigy & Co., Basle, Switzerland. Agent (Kell).

(Gau) Gäuhe & Co., Eitdorf, Germany.

(Gb) Anilinfarbenwerk, vormal's A. Gerber & Co., Basle, Switzerland. (Closed).

(Gei) Geisenheimer & Co., 189 Front St., New York; Boston, Philadelphia, Chicago. Agents for (O).

(Gr) Rob. Graesser Chemical Works, Ruabon, North Wales.

(Gt) Gilbert Aniline Co., Philadelphia.

(Grie) Farbwerke Griesheim, Germany. Agent (Bch).

(H) Read Holliday & Sons, Ltd., Huddersfield, England; 7 Platt St., New York; 125 Pearl St., Boston; 61 North Front St., Philadelphia.

(H M) Heller-Merz Co., Newark, N. J.; Maiden Lane, New York.

(H R W) Hudson River Aniline Color Works, Albany, N. Y. Agent (By).

(H S) The Hanna-Schoelkopf Co., 109 North Water St., Philadelphia. Schoelkopf, Hartford & Hanna Co., successors.

(I) Gesellschaft für Chemische Industrie, Bale, Switzerland. Agent (Klp).

(In) Innis & Co., 120 William St., New York; 36 Strawberry St., Philadelphia; 161 Kinzie St., Chicago.

(Jb) J. B. Ibels, Brussels, Belgium.

(J H) J. Hauff, Stuttgart, Germany.

(Jy) O. S. Janney & Co., 8-10 Letitia St., Philadelphia; 70 Kilby St., Boston.

(K) Kalle & Co., Biebrich-am-Rhine, Germany; 77 John St., New York; 145 Pearl St., Boston; 155 South Front St., Philadelphia.

(Kar) Ph. H. Karcher & Co., 14 Cedar St., New York.

(K B) Kächler & Buff, Crefeld, Germany. Agent (Bt).

LIST OF DYESTUFFS, MAKERS AND METHODS. 275

(Kchl) Victor Koechl & Co., 122 Hudson St., New York; 140-142 Oliver St., Boston; 39 North Front St., Philadelphia; 19 South Main St., Providence; 4 N. Clark St., Chicago. Agents for (M).

(Kell) John J. Keller & Co., 104 Murray St., New York; 135 Pearl St., Boston; 220 Church St., Philadelphia; 18 Pryor St., Atlanta, Ga.; 56 S. Water St., Providence.

(Ki) Kinzelbergér & Co., Prague, Austria.

(Klp) A. Klipstein & Co., 122 Pearl St., New York; 50-52 North Front St., Philadelphia; 283-85 Congress St., Boston; 136 Kinzie St., Chicago; 13 Mathewson St., Providence. Agents for (D H), (I) and (N).

(L) Farbwerk Mühlheim vormals A. Leonhardt & Co., Mühlheim-am-Main, Germany. Agent (Bs).

(L D) Lepetit, Dollfus e Gansser, Susa, Milan, Italy. Agent (Bd).

(Lev) Levinstein, Slackle & Crumpsall, Manchester, England.

(L M) Leeds Mfg. Co., Brooklyn, N. Y.

(Lo) Charles Lowe & Co., Stockport, England.

(L P) Lucien Picard & Co., St. Fons, Lyons, France.

(L Sch) Lembach & Schleicher, Biebrich-am-Rhine, Germany.

(M) Farbwerke vormals Meister, Lucius & Brüning, Höchst-am-Main, Germany. Agent (Kchl).

(Math) Wm. J. Matheson & Co., Ltd., 182-184 Front St., New York; 524 Atlantic Ave., Boston; 64 Exchange Place, Providence; 126 South Front St., Philadelphia; 12 North College St., Charlotte, North Carolina; 423 St. Paul St., Montreal. Agents for (C), (M Ly) and (W C B).

Cassella Color Company successors, January, 1902.

(Me) A. P. Mende, 536 West Fourteenth St., New York.

(M Ly) Manufacture Lyonnaise des Matières Colorantes. Lyons, France. Agent (Math).

(Mo) Gillard P. Monnet & Cartier, St. Fons, Lyons, France.

(Nat) National Dye Co., Philadelphia.

(N) Carl Neuhaus, Elberfeld, Germany. Agent (Klp).

(N Y B) New York & Boston Dyewood Co., 55 Beekman St., New York; 115 High St., Boston; 122 Arch St., Philadelphia; 16 Hughson St., Hamilton, Ontario.

(N I) Farbwerk W. Noetzel, Istel & Co., Griesheim-am-Main, Germany.

(O) K. Oehler, Anilin u. Anilinfarbenfabrik, Offenbach-am-Main, Germany. Agent (Gel).

(P K) Kuttroff, Pickhardt & Co., successors to Wm. Pickhardt & Kuttroff, 128 Duane St., New York; 153 Milk St., Boston; 80 South Water St., Providence; 207 Chestnut St., Philadelphia; 207 Michigan St., Chicago. Agents for (B).

(P) Société Anonyme des Matières Colorantes et Produits Chimiques de St. Denis, France. A Poirrier and G. Dalsace, Paris. Agent (S S).

(P C) Theodore Peters, Chemnitz, Germany.

LIST OF DYESTUFFS, MAKERS AND METHODS. 277

(P L) Pick, Lange & Co., Amersfoort, Holland.

(P S) Ferd. Petersen & Co., Schweizerhalle, Basle, Switzerland.

(R) Joh. Conr. Reihlen, Friedensau, Neuhausen, Germany.

(Rce) C. F. Rice, 174 Summer St., Boston.

(R D) Roberts, Dale & Co., Manchester and Warrington, England.

(R E) Dr. Remy & Co., Weissenthurm-am-Rhein, Germany.
Agent, Fr. Schroeder, 100 William St., New York.

(R F) Ruch et Fils, Pantin, France.

(Rh) Société Chimique des Usines de Rhone, France.
Agent (Bch).

(S) Chemische Fabrik vorm. Sandoz & Co., Basle, Switzerland.

(S B) A. Sevoz & Boasson, Lyons-Vaise, France.

(St) The Stamford Mfg. Co., 133-137 Front St., New York.

(Sch) Schoellkopf, Hartford & Hanna Co., successors to the Schoellkopf Aniline & Chemical Co., Buffalo, N. Y.; 100 William St., New York; 135 North Water St., Philadelphia; 21 Pearl St., Boston; 114 East Pearl St., Cincinnati; 145 Kinzie St., Chicago; 105 Reed St., Milwaukee.

(S S) Sykes & Street, 85 Water St., New York; 165 High St., Boston; 57 North Water St., Philadelphia. Agents for (P).

(S W) Stone & Ware Co., 157 Maiden Lane, New York; 39 North Front St., Philadelphia; 145 Kinzie St., Chicago; 105 Reed St., Milwaukee. Schoellkopf, Hartford & Hanna Co., successors.

(T) W. G. Thompson & Co., Middleton, England.

(tM) Chemische Fabriken vorm. Weiller-ter Meer, Uerdingen, Germany.

(V) Verein Chemischer Fabriken in Mannheim, Germany.
Agent, Roessler & Hasslacher Chemical Co., 100 William St., New York.

(W) Williams Bros., Hounslow, Middlesex, England.

(W C B) W. C. Barnes & Co., Ltd., Hackney Wick, London, England. Agent (Math).

(Z) Friedrich Zimmer, Mannheim, Germany.

DYEING METHODS.

For economy of space, in order that the information may be more readily found, the dyeing methods are given by certain suggestive letters in accordance with the following:—

WA indicates wool is dyed with acetic acid.

WN means that wool is dyed in a neutral bath.

WG indicates that wool is dyed in a bath containing Glauber's salts.

WGS means that wool is dyed with Glauber's salts and sulphuric acid in the bath.

WGSch indicates that wool is first dyed with Glauber's salt and sulphuric acid in the bath and the color then developed with chrome.

WACH means that wool is first dyed with acetic acid and chrome added to develop the color.

WCh indicates that chromed wool is used with the dye.

LIST OF DYESTUFFS, MAKERS AND METHODS. 279

SA means that silk is dyed in a bath acidified with acetic acid.

SS means that silk is dyed in a bath acidified with sulphuric acid.

CT indicates that the dyestuff is used on cotton mordanted with tannin.

CD means that cotton is dyed direct in one bath.

CDv indicates that the color is developed on cotton by subsequent treatment after direct dyeing.

CAL indicates cotton dyed with alum and Glauber's salt.

CWD—cotton and wool mixed goods dyed in one bath.

SULPHUR denotes one of the new class of sulphur dyes requiring special treatment.

These extremely brief directions are used for the further reason that the dye manufacturers themselves prefer that specific information be obtained from their offices; in many places no dyeing suggestions are given for this very reason.

Name of Dye.	Agent or Maker.	Dye Method.
Acetine Blue.....	P K.....	Printing
Acetinduline R.....	Kchl	Printing
Acetopurpurine 8B.....	A	CD
Acetyline Blue 6B.....	Klp	CD
Acid Alizarine Black AF.....	Kchl	WGSCh
Acid Alizarine Black 3B, 3Bex.....	Kchl	WGSCh
Acid Alizarine Black R.....	Kchl	WGSCh
Acid Alizarine Black T.....	Kchl	WGSCh
Acid Alizarine Blue BB.....	Kchl	WGSCh
Acid Alizarine Blue GR.....	Kchl	WGSCh
Acid Alizarine Blue Black B.....	Kchl	WGSCh
Acid Alizarine Brown B.....	Kchl	WGSCh
Acid Alizarine Garnet R.....	Kchl	WGSCh
Acid Alizarine Gray G.....	Kchl	WGSCh
Acid Alizarine Green B.....	Kchl	WGSCh
Acid Alizarine Green G.....	Kchl	WGSCh
Acid Alizarine Grenade.....	Kchl	WGSCh
Acid Anthracine Brown T.....	By	WGSCh
Acid Black B.....	AAC	WGS
Acid Black B No. 4.....	AC	WGS
Acid Black 5B, 8B.....	By	WGS
Acid Black 10B.....	Sch	WGS
Acid Black 77.....	AC	WGS
Acid Black 2531.....	Kell	88
Acid Black 5534.....	H	WGS
Acid Black 5535.....	H	WGS
Acid Black S, 3G.....	H	WGS
Acid Blue AA.....	Kell	WGS
Acid Blue BB.....	SCH	WGS
Acid Blue GG.....	Sch	WGS

LIST OF DYESTUFFS, MAKERS AND METHODS. 281

Name of Dye.	Agent or Maker.	Dye Method.
Acid Blue FS.....	Kchl	WGS
Acid Blue 76.....	SCH	WGS
Acid Blue 100.....	SCH	WGS
Acid Blue Black 3B.....	By	WGS
Acid Brown.....	Bs	WGS
Acid Brown D.....	Math	WGS
Acid Brown G.....	A	WGS
Acid Brown R.....	A	WGS
Acid Brown Y.....	Sch	WGS
Acid Carmoisine B.....	Bk	WGS
Acid Carmoisine 6B.....	H	WGS
Acid Cerise.....	Kchl, S S....	WGS, SS
Acid Cerise O, ii.....	Kchl	WGS, SS
Acid Chrome Black BG.....	By	WGSCh
Acid Crimson.....	Bs	WGS
Acid Cyanine BR.....	By	WGS
Acid Eosine G.....	Kchl	WGS
Acid Fuchsine.....	Bs, Kchl, Klp....	WGS
Acid Fuchsine S B.....	P K.....	WGS
Acid Green.....	By, Klp, O....	WGS, SS
Acid Green B.....	P	WGS
Acid Green 2B.....	P	WGS
Acid Green 3B, 6B.....	By, P.....	WGS
Acid Green 4B.....	P	WGS
Acid Green bluish.....	NI	WGS, SS
Acid Green conc.....	Kchl	WGS
Acid Green conc. D.....	Kchl	WGS
Acid Green conc. G.....	Kchl	WGS
Acid Green conc. M. sol.....	Kchl	WGS
Acid Green conc. ii.....	Kchl	WGS
Acid Green D.....	Kchl	WGS, SS
Acid Green EC.....	Kchl	WGS, SS
Acid Green extra conc. B.....	Math	WGS, SS
Acid Green extra conc. paste.....	Math.	
Acid Green GG.....	H	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Acid Green 5G.....	Math	WGS
Acid Green J.....	P	WGS
Acid Green JJ.....	Math.....	WGS, SS
Acid Green JEEE.....	P	WGS
Acid Green M.....	Kchl.....	WGS, SS
Acid Green M., 5 fold conc.....	Kchl	WGS
Acid Green O.....	Kchl	WGS
Acid Green OG.....	O.....	WGS, CT
Acid Green 130.....	Math	WGS
Acid Green 745.....	Math	WGS
Acid Green 780.....	Math	WGS
Acid Grenadine	Kell	WGS
Acid Grenadine B.....	Kell	WGS
Acid Indigo Blue.....	H	WGS
Acid Magenta	Kchl, PK, SS.....	WGS, SS
Acid Magenta B.....	Kchl.....	WGS, SS
Acid Magenta BC Crystals.....	Kell.....	WGS, SS
Acid Magenta Crystals.....	Kchl.....	WGS, SS
Acid Magenta GC Crystals.....	Kell.....	WGS, SS
Acid Magenta O.....	Kchl.....	WGS, SS
Acid Maroon O.....	Kchl.....	WGS, SS
Acid Methyl Violet 87B.....	P K.....	WGS
Acid and Milling Scarlet.....	Br S.....	WGS
Acid Naphthol Orange.....		WGS
Acid Navy Blue.....	Bd	WGS
Acid Orange G.....	Kell.....	WGS, SS
Acid Phosphine JO.....	C	Leather
Acid Phosphine GO.....	Kchl	Leather
Acid Phosphine BRO.....	Kchl	Leather
Acid Ponceau	Klp	WGS
Acid Rhodamine R.....	Klp	WGS
Acid Rosamine A pat	Kchl.....	WGS, SS
Acid Rubin (see Fuchsine Ex. S).....		WGS, SS
Acid Rubin SB.....	P K.....	WGS
Acid Ruby	Klp	WGS

LIST OF DYESTUFFS, MAKERS AND METHODS. 283

Name of Dye.	Agent or Maker.	Dye Method.
Acid Violet 2B.....	Kell, P K.....	WGS
Acid Violet 3B extra.....	By	WGS
Acid Violet bluish	Kell	WGS
Acid Violet 2BN.....	P K.....	WGS
Acid Violet 4B extra.....	By	WGS
Acid Violet 4BN.....	Klp, PK.....	WGS
Acid Violet 4BS.....	Math	WGS, SS
Acid Violet 4BX.....	By	WGS
Acid Violet 5B extra.....	Kell	WGS
Acid Violet 5BF.....	Kchl	WGS
Acid Violet 5BFI.....	Kchl	WGS
Acid Violet 5BS.....	At	WGS
Acid Violet 5BX.....	Math	WGS
Acid Violet 6B.....	A, By Kell.....	WGS
Acid Violet 6BC.....	Sch	WGS
Acid Violet 6BF.....	Kchl	WGS
Acid Violet 6BIN 6BS.....	Kchl	WGS
Acid Violet 6BN.....	Klp, PK.....	WGS, SS
Acid Violet 6BS.....	Kchl	WGS
Acid Violet 7B.....	Kchl, Klp, PK.....	WGS, SS
Acid Violet 7BN.....	Kchl	WGS
Acid Violet Double	Kell	WGS
Acid Violet N.....	Kchl	WGS
Acid Violet R.....	O	WGS
Acid Violet R conc.....	Kchl	WGS
Acid Violet R extra.....	By	WGS
Acid Violet R R.....	Kell	WGS
Acid Violet 2R extra.....	By	WGS
Acid Violet 3R extra.....	By	WGS
Acid Violet 3RA.....	Kchl	WGS
Acid Violet 3RS	Kchl	WGS
Acid Violet 4R.....	Klp, PK.....	WGS
Acid Violet 4RS.....	Kchl	WGS
Acid Violet 5R.....	S W.....	WGS
Acid Violet 6R.....	Sch	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Acid Violet VSW.....	O	WGS
Acid Violet ii.....	Kchl	WGS
Acid Violet 118.....	HS	WGS
Acid Violet 08580.....	Math	WGS
Acid Yellow	A, Kchl, Klp, Math, O, SS.	WGS
Acid Yellow crystals.....	Kchl, Math.....	WGS
Acid Yellow D.....	A	WGS
Acid Yellow G.....		
Acid Yellow RS.....	Bs	WGS
Acid Yellow S, see Naphthol Yellow...	S.	
Acid Yellow 8822.....	H	WGS
Acme Brown 70462.....	Math	CT
Acme Brown 70465.....	Math	CT
Acme Yellow	Kchl	WGS, SS
Acridine Orange	Kchl.....	SA, CT
Acridine Orange G.....	Bs	CT
Acridine Orange NO.....	Kchl	CT
Acridine Orange R extra	Kchl	CT
Acridine Red B, 2B, 3B.....	Kchl	CT
Acridine Scarlet R, 2R, 3R.....	Kchl.	
Acridine Yellow.....	Kchl.....	SA, CT
Alcohol Blue	S, Bs, By, Kchl, PK, SS	
Alcohol Blue SFC.....	K.	
Alcohol Eosine	tM.	
Alizarine Black Bayer FB, NG, GA...	By	WGSch
Alizarine Black BO.....	Math	WA
Alizarine Black 3BO.....	Math	WA
Alizarine Black 4B.....	Math	WA
Alizarine Black 4BN.....	Math	WA
Alizarine Black 4BR.....	Math	WA
Alizarine Black 6B.....	Math	WA
Alizarine Black 6BO.....	Math	WA
Alizarine Black D.....	Math	WA
Alizarine Black DAC.....	Kchl	CDv
Alizarine Black DCB.....	Kchl	CDv

LIST OF DYESTUFFS, MAKERS AND METHODS. 285

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Black DCR.....	Kchl	CDv
Alizarine Black DE.....	Kchl	CDv
Alizarine Black DG.....	Kchl	CDv
Alizarine Black DHW.....	Kchl	CDv
Alizarine Black DN.....	Kchl	CD
Alizarine Black DPG.....	Kchl	CDv
Alizarine Black DPR.....	Kchl	CDv
Alizarine Black DR.....	Kchl	CDv
Alizarine Black DRN.....	Kchl	CD
Alizarine Black DT.....	Kchl	CDv
Alizarine Black DYG.....	Kchl	CDv
Alizarine Black G.....	Me	WCh
Alizarine Black P.....	Kchl	WCh
Alizarine Black R.....	Bs, Math	WCh
Alizarine Black RF.....	Math	WA
Alizarine Black RT.....	Kchl	CDv
Alizarine Black S.....	Kchl, Math, PK	WCh
Alizarine Black SRA.....	P K	WCh
Alizarine Black SW.....	P K	WCh
Alizarine Black T.....	Math	WCh
Alizarine Black WA.....	Math	WCh
Alizarine Black WX extra.....	Pk	WACH
Alizarine Black X2B.....	Math	WA
Alizarine Black X3B.....	Math	WA
Alizarine Black 01221, 5218, 72458, 73038	Math	WA
Alizarine Blue A.....	Kchl	WCh
Alizarine Blue A B.....	B A Co	WCh
Alizarine Blue Black SW.....	P K	WCh
Alizarine Blue B R 3 G.....	By	WCh
Alizarine Blue C G.....	By	WCh
Alizarine Blue C S, W R N Paste.....	Math	WCh
Alizarine Blue DB.....	Kchl	CD
Alizarine Blue DBX.....	Kchl	CD
Alizarine Blue DE.....	Kchl	CD
Alizarine Blue DET.....	Kchl	CD

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Blue DG.....	Kchl	CD
Alizarine Blue D N.....	Kchl	WCh
Alizarine Blue D N W.....	Kchl	WCh
Alizarine Blue D N X.....	Kchl	WCh
Alizarine Blue DR, D2R, D4R.....	Kchl	CD
Alizarine Blue FA.....	Kchl	WCh
Alizarine Blue G.....	Kchl	WCh
Alizarine Blue G B, P L.....	AC	WCh
Alizarine Blue G N.....	Bs	WCh
Alizarine Blue G S.....	At	WCh
Alizarine Blue G T.....	Bs	WCh
Alizarine Blue G W.....	By	WCh
Alizarine Blue J G.....	H S.	WCh
Alizarine Blue NGG powder.....	P K.	WCh
Alizarine Blue N S.....	By	WCh
Alizarine Blue O D R.....	At	WCh
Alizarine Blue paste.....	Kchl	WCh
Alizarine Blue R.....	By, Kchl.	WCh
Alizarine Blue RR.....	Kchl	WCh
Alizarine Blue S A P, SKY.....	By	WGS, WCh
Alizarine Blue S paste.....	P K.	WCh
Alizarine Blue S powder.....	P K.	WCh
Alizarine Blue SB powder.....	Kchl	Printing
Alizarine Blue SBW powder.....	Kchl	WCh
Alizarine Blue SCA.....	Ac	WCh
Alizarine Blue SR.....	Kchl	Printing
Alizarine Blue S2R.....	Kchl	Printing
Alizarine Blue soluble powder ABS.....	B A Co.	WCh
Alizarine Blue 1607.....	Math	WCh
Alizarine Blue Black B, 3B.....	By	WCh
Alizarine Bordeaux B in paste.....	By	WCh
Alizarine Bordeaux B D in paste.....	By	WCh
Alizarine Bordeaux P.....	Kchl	WCh
Alizarine Bordeaux C.....	Me	WCh
Alizarine Bordeaux G, GG.....	By	WCh

LIST OF DYESTUFFS, MAKERS AND METHODS. 287

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Brown	By, PK, Kchl....	WCh
Alizarine Brown AS.....	Klp	WCh
Alizarine Brown DB.....	Kchl	CD
Alizarine Brown DBD.....	Kchl	CD
Alizarine Brown DD.....	Kchl	CD
Alizarine Brown, DG, D2G, D3GO, D3GI	Kchl	CD
Alizarine Brown DM.....	Kchl	CD
Alizarine Brown DR.....	Kchl	CD
Alizarine Brown DX.....	Kchl	CD
Alizarine Brown G.....	Kchl	WCh
Alizarine Brown GN, AW, AT.....	By	WCh
Alizarine Brown KC5G.....	By	Sulphur
Alizarine Brown O DR.....	At	WCh
Alizarine Brown paste	Kchl	WCh
Alizarine Brown powder.....	By, Kchl.....	WCh
Alizarine Brown O.....	Kchl	WCh
Alizarine Brown R.....	Kchl, Me, Rice...	WCh
Alizarine Brown R B.....	By	WCh
Alizarine Brown S O.....	P K.....	WCh
Alizarine Brown Y.....	By	WCh
Alizarine Cardinal	By.....	
Alizarine Carmine	B A Co.....	WCh
Alizarine Carmine Blue B, G.....	By	WCh
Alizarine C A	B A Co.....	WCh
Alizarine Claret DB, DG.....	Kchl	CD
Alizarine Claret R paste	Kchl	WCh
Alizarine Black G paste.....	By	WCh
Alizarine Cyanine G paste.....	By	WCh
Aliz. Cyanine R, 2R, 3R, RA extra, ..	By	WCh
Alizarine Dark Blue.....	P K.....	WCh
Alizarine Dark Blue, D, DR.....	Kchl	CD
Alizarine Dark Blue D3R.....	Kchl	CD
Alizarine Dark Blue S.....	Kchl	WCh
Alizarine D G, GI	P K.....	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Green paste.....	Pk	WCh
Alizarine Green B.....	Bs	WCh
Alizarine Green C, SS.....	By, Rice	WCh
Alizarine Green CE paste, CG, CK....	By.....	WGS, WCh
Alizarine Green CE paste, CG, CK....	By	WCh
Alizarine Green DW.....	P K.....	WCh
Alizarine Green EB, G.....	Bs	WCh
Alizarine Green F powder.....	Sch	WCh
Alizarine Green KO.....	By	Sulphur
Alizarine Green S paste.....	P K.....	WCh
Alizarine Green SE.....	Kchl, PK.....	WCh
Alizarine Green S pat.....	Math	WCh
Alizarine Grenat R.....	Kchl	WCh
Alizarine Indigo DO.....	Kchl	CD
Alizarine Indigo S paste.....	P K.....	WCh
Alizarine Lanacyl Blue BB, 3B.....	Math	WCh
Alizarine Lanacyl Navy Blue B pat....	Math	WA
Alizarine Lanacyl Blue R.....	Math	WA
Alizarine Lanacyl Violet B pat.....	Math	WA
Alizarine Maroon paste	P K.....	WCh
Alizarine Olive OD.....	At	WCh
Alizarine Orange A paste.....	P K.....	WCh
Alizarine Orange AO, AOP.....	B A Co.....	WCh
Alizarone Orange DF, DG, DR.....	Kchl	CD
Alizarine Orange G.....	By, Kchl.....	WCh
Alizarine Orange N.....	Kchl	WCh
Alizarine Orange powder	Kchl	WCh
Alizarine Orange R.....	Kchl	WCh
Alizarine P.....	B A Co.....	WCh
Alizarine Red D4B.....	Kchl	CD
Alizarine Red E D.....	Bs	WCh
Alizarine Red F paste.....	Kchl	WCh
Alizarine Red GG.....	P K.....	WCh
Alizarine Red PS.....	By	WCh
Alizarine Red RG.....	Kchl	WCh

LIST OF DYESTUFFS, MAKERS AND METHODS. 289

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Red RX.....	Kchl	WCh
Alizarine Red S.....	PK, Kchl	WCh
Alizarine Red SDG.....	Kchl	WCh
Alizarine Red WB.....	By	WCh
Alizarine Red WS.....	Kchl	WCh
Alizarine Red X.....	Kchl	WCh
Alizarine Red D, 1B new.....	Kchl	WCh
Alizarine Red No. 1 powder.....	Kchl	WCh
Alizarine Red 2A.....	Kchl	WCh
Alizarine Red 2ABL, BL.....	Kchl	WCh
Alizarine Red 2 BW.....	Kchl	WCh
Alizarine Red 1 W.....	Kchl	WCh
Alizarine Red 1 WS.....	Kchl	WCh
Alizarine Red 2 A W.....	Kchl	WCh
Alizarine Red 2W.....	Kchl	WCh
Alizarine Red 2 WS.....	Kchl	WCh
Alizarine Red 3 GW.....	Kchl	WCh
Alizarine Red 3W.....	Kchl	WCh
Alizarine Red 3 WS.....	Kchl	WCh
Alizarine Red 4 FW.....	Kchl	WCh
Alizarine Red 4 WS.....	Kchl	WCh
Alizarine Red 5 WS.....	Kchl	WCh
Alizarine Saphirol SE.....	By	WGS
Alizarine Saphirol B.....	By	WGS
Alizarine Scarlet pat.....	Math	WGS
Alizarine Scarlet DG, D2R.....	Kchl	CD
Alizarine Sky Blue.....	By	WGS
Alizarine Violet extra.....	At	WCh
Alizarine Violet G paste.....	Kchl	WCh
Alizarine Violet N.....	St	WCh
Alizarine Violet B.....	Bs	WCh
Alizarine Violet paste.....	Kchl	WCh
Alizarine Viridine paste FF.....	By	WCh
Alizarine Yellow A paste.....	P K	WCh
Alizarine Yellow C.....	Bs	WCh

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Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Yellow DG, DR, D3G, DOO.	Kchl	CD
Alizarine Yellow FS.	Klp	WCh
Alizarine Yellow GG, GGW, N.	Kchl	WCh
Alizarine Yellow LW.	P K.	WCh
Alizarine Yellow OD, paste, R, RW powder	Kchl	WCh
Alkali Blue.	A, Brs, Bs, By, Sch, Kell, Klp, Math, O, PK, SS	
Alkali Blue B, 2B, 3B, 4B, 5B, 6B, 7B, BBR, R, R conc extra	Kchl.	
Alkali Blue B, 2B, 3B, 4B, 5B, 6B, 6B90 per cent., 6B, 100 per cent., R, 2R, 3R	Math.	
Alkali Blue 2B, 3B, 4B, 5B, 6B, H6B, H5BOO, H3BOO	O.	
Alkali Blue D.	A.	
Alkali Blue 4B.	Jb.	
Alkali Blue XG.	Br. S.	
Alkali Brown	Bs	CD
Alkali Brown R.	L P.	CD
Alkali Green	Br. S.	
Alkali Red	Bs.	
Alkali Red B, R.	Kchl.	
Alkali Violet CA.	PK.	
Alkali Violet R.	By.	
Alkali Yellow, R.	Bs.	
Alpine Blue		WGS
Alsace Brown B, BB, BR, LL, R.	At	CD
Alsace Gray	Fi.	
Alsace Green, J.	FTM.	
Amaranth	Kchl, Math.	SS
Amaranth B.	Math	WGS, SS
Amaranth E, O.	Kchl	WGS, SS
Amaranth extra	SS.	

LIST OF DYESTUFFS, MAKERS AND METHODS. 291

Name of Dye.	Agent or Maker.	Dye Method.
American Blue		
Amethyst Violet.....	Math.	
Amidoazol Cutch.....	H	CD
Amidoazol Drab.....	H	CD
Amidoazol Gray.....	H	CD
Amidoazol Green B.....	H	CD
Anil Blue R.....	K.	
Aniline Brown	Fl.	
Aniline Green	Math	WGS, CT
Aniline Grey B, R.....		
Aniline Orange	Math	CT
Aniline Pink		
Aniline Purple.....		
Aniline Red.....		
Aniline Yellow	Bt.....	WGS, SS, CT
Aniline Yellow extra	Klp.	
Aniline Yellow NT.....	Math	CD
Anisoline	Math	CD
Anisol Red	Mo.....	WGS, SS, CD
Anthra Alizarine Bordeaux.....	At	WACH
Anthra Alizarine Carmoisine.....	At	WACH
Anthra Alizarine Green CG.....	At	WACH
Anthra Alizarine Red B.....	At	WACH
Anthra Alizarine Yellow G.....	At	WACH
Anthracene Acid Black C.....	Klp	WCh
Anthracene Acid Black LW, SF, ST, SW	Math	WGS
Anthracene Acid Brown B, G, N, R, SW pat, v	Math..	WGS, WCh, SA
Anthracene Black		
Anthracene Blue C.....	Math	WCh
Anthracene Blue S, SWX, WB, WG, WR, SWGG extra.....	PK	WCh
Anthracene Brown paste	Ba, Co, By.....	WCh
Anthracene Brown G paste, R paste...	By	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Anthracene Brown O paste.....	Kchl	WCh
Anthracene Brown RR.....	Bs	CDv
Anthracene Chrome Black, F, 5B, FE.	Math	WGS, WCh
Anthracene Croceine B, G.....	F	WCh
Anthracene Dark Blue	PK	WCh
Anthracene Green, or Coeruleine.....		WCh
Anthracene Red	By, I, Klp.....	WGS
Anthracene Red B.....	HS	WGS
Anthracene Scarlet OR.....	HS	WGS
Anthracene Violet		WCh
Anthracene Yellow paste.....	By	WCh
Anthracene Yellow BN, C, GG, R.....	Math	WGS, WCh
Anthracene Yellow GN.....	Bs	WCh
Anthracite Black BR.....	Math	WGS
Anthragallol, or Anthracene Brown...	Math	WCh
Anthramine Yellow	At	WCh
Apollo Red	Kell	WGS
Arabian Black.....	Bai	CD
Archil Red 3 VN.....	P	WGS
Archil Substitute N powder	Math	WGS
Archil Substitute G Powder	Kchl	WGS
Archil Extract, 1, 2, 3, 4.....	Math	WGS
Archil Extract extra and conc.....	Kchl	WGS
Arnica Yellow	Kell.	
Atlanta Yellow 103.....	HS	CD
Atlas Orange	BrS	WGS, SS
Atlas Red	BrS	WGS, SS
Atlas Scarlet	By	WGS
Auramine G.....	G, Klp, PK....	WG, CT
Auramine O, I II, conc.....	G, Klp, Kchl, PK, WG, CT	
Arabian Black	Bai	CD
Aurantia	A	SS
Aureoline	Klp	CD
Aureosine		
Aurine	Gr, Lo, LP, Mo, RD.	

LIST OF DYESTUFFS, MAKERS AND METHODS. 293

Name of Dye.	Agent or Maker.	Dye Method.
Aurophenine	Kchl	CD
Aurophosphine G.....	A	SA
Aurotine	ClCo.	
Autogene Black.....	SS	Sulphur
Autogene Brown BG.....	SS	Sulphur
Azaleine		
Azarin R, S.....	Kchl	Lakes
Azin Blue, alcohol soluble	Bs.	
Azindon Blue G, R.....	Kchl	CT
Azin Green GO, BO, TO.....	Kchl	WGS, CT
Azin Scarlet G conc. GO.....	Kchl	WG, SA, CT
Azo Acid Black B, BL, G, GL, 3BL, R, TL, extra conc., TL, No. 2 extra.....	Kchl	WGS
Azo Acid Black 72185 Nos 1, 2, 3.....	Math	WGS
Azo Acid Blue B, 4.....	Kchl	WGS
Azo Acid Brown	By	WGS
Azo Acid Carmine B.....	Kchl	WGS
Azo Acid Fuchsine B, G.....	Kchl	WGS
Azo Acid Magenta B, C, B conc., G conc.	Kchl	WGS
Azo Acid Ruby, 2B.....	Bs	WGS
Azo Acid Violet 4R.....	By	WGS
Azo Acid Yellow	A	WGS
Azo Alizarine Yellow CG.....	DH	Printing
Azo Black O.....	Kchl	WGS, SS
Azo Black Blue	O.	
Azo Blue	A, By, Kchl.....	Lev
Azo Bordeaux.....	Sch, By, O.....	WGS
Azo Brown N.....	Bs, Math.....	WGS
Azo Brown O.....	Kchl	WGS
Azo Brown V.....	Kchl	WGS
Azo Brown Y.....	P	WGS
Azo Carmine G paste.....	P K.....	WGS
Azo Carmine G.....	A	WGS
Azo Cardinal G.....	A	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Azo Chromine	Kell	WGS
Azo Coccine 7B, or Cloth Red.....	A	WGS
Azo Coccine G, or Tropaeoline 0000...		WGS
Azo Coccine 2R.....	A	WGS
Azo Cochineal	By	WGS
Azo Coralline.....	Bs	WGS
Azo Corinth	O.	
Azo Crimson L, S.....	By	WGS
Azo Dark Blue	O	CD
Azo Diphenyl Blue		
Azo Eosine	By	WGS
Azo Flavine	Bs, PK.....	WGS, SS
Azophone Black	At	CD
Azophone Green B, G.....	At	CD
Azo Fuchsine B, G, GN, S.....	By	WGS
Azo Galleine	Kell	WCh
Azo Green	By	WCh
Azo Grenadine S.....	By	WGS
Azo Mauve B, R.....	O	CD
Azo Orange R.....	Klp	CD
Azo Orseille BB.....	Math	WGS
Azo Orseille R.....	A.	
Azo Orseilline	A, By, O, P K.	
Azophenine Blue R.....	Grie	CT
Azophening Blue G R.....	NI.	
Azophor Black S.....	Kchl	Printing
Azophor Blue D.....	Kchl	Printing
Azophor Orange MN.....	Kchl	Printing
Azophor Orange	Kchl	Printing
Azophor Red PN	Kchl	Printing
Azo Rubinc.....	O, Sch.....	WGS
Azo Rubine	O	WGS
Azo Rubine A.....	Math	WGS
Azo Ruby	tM, Lev.....	WGS
Azo Ruby S, 2S.....	A	WGS

LIST OF DYESTUFFS, MAKERS AND METHODS. 295

Name of Dye.	Agent or Maker.	Dye Method.
Azo Saffranine	Kell	WGS
Azo Turkey Red.....	O.	
Azo Violet	A, By, Kchl, Lev...	CD
Azo Yellow	Bt, K, Kchl, Klp, O, SS	WGS, SS
Azo Yellow C.....	SW	WGS
Azo Yellow M.....	Klp	WGS, SS
Azo Yellow N, NR.....	Kell	SS
Azo Yellow OR.....	Kchl	WGS, SS
Azo Benzol Fast Crimson	P K.....	WGS
Basel Blue, BB, R paste, S.....	Klp.....	WG, CT
Bavarian Blue alcohol soluble.....	A.	
Bavarian Blue DBF, DSF.....	A	SA, CT
Belgium Blue	AC.	
Bengal Blue	K, SS.	
Bengal Deep Black D.....	SS	CDs
Bengal Pink	Klp	WGS
Benzaline Blue B.....	K	CT
Bengaline Blue 70882.....	Math	CT
Benzal Green, O powder, OO crystals..	O	WN, CT
Benzidine Blue		
Benzidine Red		
Benzindamine	NI.	
Benzo Azurine G, 3G.....	A, By, Kchl.....	CD
Benzo Azurine R.....	By, Kchl.....	CD
Benzo Black	By, Kchl.....	CD
Benzo Black Blue G, 5G, R.....	By, Kchl.....	CD
Benzo Black Brown	By	CD
Benzo Blue BB, 3B, BX.....	By	CD
Benzo Bordeaux 6B.....	By	CD
Benzo Brown G, 5R, RC.....	By	CD
Benzo Chrome Black B.....	By	CD
Benzo Chrome Black Blue, B.....	By	CD
Benzo Chrome Brown B, BS, 5G, R, 3RBy		CD

Name of Dye.	Agent or Maker.	Dye Method.
Benzo Copper Blue B.....	By	CD
Benzo Cyanine B, 3B, R.....	By	CD
Benzo Dark Brown	By	
Benzo Dark Green B, BB, GG.....	By	CD
Benzo Fast Black 3B, G.....	By	CD
Benzo Fast Blue B, Bn.....	By	CD
Benzo Fast Gray	By	CD
Benzo Fast Orange S.....	By	CD
Benzo Fast Red L.....	By	CD
Benzo Fast Scarlet 4Bs, 8Bs.....	By	CD
Benzo Fast Violet R.....	By	CD
Benzo Flavine O. No. 2.....	O	CT
Benzo Gray	By	CD
Benzo Green G.....	By	CD
Benzo Indigo Blue	By, Kchl.....	CD
Benzo Nitro Brown G, N, 2R.....	By	CD
Benzo Nitrol Bordeaux G.....	By	CDv
Benzo Olive extra.....	By	CD
Benzo Orange R.....	A, By, Kchl.....	CD
Benzopurpurine B, 4B, 6B, 10B.....	A, By, Kchl.....	CD
Benzopurpurine 4Bex conc.....	Kchl	CD
Benzopurpurine 4B double.....	Kchl	CD
Benzo Red SG.....	By	
Benzo Rhodamine 3B.....	By	CD
Benzo Rhoduline Red B, 3B.....	By	CD
Benzo Sky Blue	A, By, Kchl.....	CD
Benzoyl Green		
Benzoyl Rose	SS.	
Benzyl Violet	Bt, CR, RE, tM, WGS, SS, CT	
Best Magenta Crystals.....	Bt.	
Best Violet, or Brilliant India Dye.....	Bt.	
Biebrich Acid Blue, G, GG.....	K	WGS
Biebrich Acid Red B, 4B, 3G.....	K	WGS
Biebrich Acid Violet 2B, 6B.....	K	WGS

LIST OF DYESTUFFS, MAKERS AND METHODS. 297

Name of Dye.	Agent or Maker.	Dye Method.
Biebrich Alizarine Black 4BN.....	K	WGS
Biebrich Patent Black AN, 4AN, AO 4BN, RO.....	K	WGS
Biebrich Patent Jet Black, 3BO.....	K	WGS
Biebrich Scarlet	K	WGS
Bismark Brown	A, CR, F, K, Math, NI. O, PK, SW.....	CT
Bismarck Brown B.....	Klp	CT
Bismarck Brown EE.....	Math	CT
Bismarck Brown FFG.....	Math	CT
Bismarck Brown G.....	Klp	CT
Bismarck Brown GG.....	Math, O.....	CT
Bismarck Brown GOO, GOOO.....	O	CT
Bismarck Brown PF, PS, R3833.....	Math	CT
Bismarck Brown R, G.....	Kchl	CT
Bismarck Brown ROO, ROOO.....	O	CT
Bismarck Brown T.....	Klp	CT
Bismarck Brown YS 8049.....	Math	CT
Bitter Almond Oil Green	Bt	WGS, SS, CT
Black Black O.....	Math	WGS, SS
Black Blue O.....	Kchl, Math...	WGS, SS
Blackley Blue	Lev	SS, CT
Black Soluble in Oil	Kchl, Math.	
Blue Asozin	P	WGS
Blue Alcohol Soluble	Kchl.	
Blue B, BB	Kchl	Printing
Blue BJB	P	WGS
Blue Black B.....	P K.....	WGS
Blue Black GR.....	Klp	WGS
Blue Black Diphenyl.....	Kell	CD
Blue BS	Math. P.....	WGS
Blue 3BS	P	WGS
Blue BW.....	O.	
Blue CB, alcohol and water soluble...	Klp.	
Blue extra	RD	CT

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Name of Dye.	Agent or Maker.	Dye Method.
Blue for Silk.....	Math.	
Blue for printing, paste and powder...	Kchl.	
Blue for white.....	Kell	SS
Blue G.....	Jy	CT
Blue, green shade.....	Kchl.....	WGS, SS, CT
Blue Green S.....	P K.	
Blue R.....	Kchl	Printing
Blue, red shade.....	Kchl.....	WGS, SS, CT
Blue T conc.....	Kchl	WGS, SS
Blue 2111.....	At	CD
Blue Black No. 1, 2.....	Bai.	
Blue Black 5534.....	H	WGS
Body Blue O.....	Kchl.....	WGS, SS, CT
Bordeaux	SW	CD
Bordeaux B.....	A, Kchl, Math, LP..	RF
Bordeaux BL.....	Math	WGS, SS
Bordeaux BX.....	By	WGS
Bordeaux COV.....	A	WGS, CD
Bordeaux DH.....	Klp	WGS
Bordeaux Diamine B, S.....	Math	CD
Bordeaux extra	By	WGS
Bordeaux G.....	Bs, By.....	WGS
Bordeaux R extra.....	Kchl	WGS
Bordeaux S.....	A, RF.....	WGS
Bottle Green	Bch.	
Braxeline	At.	
Brahma Orange	Z.	
Brahma Red B, BB, 6B.....	Z.	
Bright Blue extra.....	Kchl	CD
Bright Blue O.....	B L.....	CD
Bright Yellow T.....	Kchl, P K.....	CD
Brilliant Acid Carmine 6B.....	O	WGS
Brilliant Acid Green 6B.....	By	WGS
Brilliant Alizarine RR, 5R.....	By	CD
Brilliant Alizarine Blue D, G, R.....	By	WCh

LIST OF DYESTUFFS, MAKERS AND METHODS. 299

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Alizarine Blue EM.....	Kchl	WCh
Brilliant Alizarine Cyanine G, 3G....	By	WCh
Brilliant Azurine B.....	A, By.....	CD
Brilliant Azurine 5G.....	A, By, Kchl.....	CD
Brilliant Benzo Green B.....	By	CD
Brilliant Black B.....	P K.....	WGS
Brilliant Black solution BE, NE, RE..	Math.	
Brilliant Blue	Bs.	
Brilliant Blue 7B.....	O.	
Brilliant Blue HB.....	Gt	WGS
Brilliant Bordeaux S.....	A	WGS
Brilliant Carmoisine O.....	A	WGS
Brilliant Cochineal 2R, 4R.....	Math	WG
Brilliant Chrome Red, paste.....	By.	
Brilliant Congo G, R.....	A, By, Kchl.....	CD
Brilliant Cotton Blue B57.....	Sch	CAI
Brilliant Cotton Blue, greenish.....	By	CT
Brilliant Cresyl Blue 2B.....	L.	CT
Brilliant Crimson B, O.....	Kchl	WGS, CT
Brilliant Crocein blue, and yellow....	Kchl	WGS, SS, CD
Brilliant Croceine AZ.....	Math	WGS
Brilliant Crocein B, BB.....	Kchl	WGS, SS
Brilliant Croceine 3B.....	By, Kchl, Math.....	WGS, SS
Brilliant Croceine BOO.....	Math	WGS
Brilliant Crocein 3B.....	By, Kchl.....	WGS, SS
Brilliant Croceine 5B.....	Kchl, Math...	WGS, SS
Brilliant Croceine 6B, 7B, 9B, 10B...	Math	WGS
Brilliant Croceine D.....	Kchl	WGS
Brilliant Croceine GB.....	Math	WGS
Brilliant Croceine M, MOO.....	Math	WGS
Brilliant Croceine R.....	Kchl, Math.....	WGS
Brilliant Croceine ROO.....	Math	WGS
Brilliant Croceine Scarlet D.....	Kchl	WGS
Brilliant Cyanine Blue R.....	By	WCh

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Diazine Blue B, B.....	K.	
Brilliant Direct Navy Blue B.....	Bs	CD
Brilliant Direct Red 249.....	Sch	CD
Brilliant Geranine B, 3B.....	By	CD
Brilliant Green	By, CJ, CR, F, K, Kchl, Klp, Math, PK, NI, O, PS, RE, tM, Bt..	WGS, SS, CT WGS, SS, CT
Brilliant Green crystals, C.....	SW	WGS, CT
Brilliant Green crystals extra, extra N, powder superior, ia, No. 12.....	Kchl	WN, SA, CT
Brilliant Green O crystals.....	O	WN, CT
Brilliant India Dye		
Brilliant Lake Scarlet G, R, 2 R.....	Kchl	WGS, SS
Brilliant Milling Green B.....	C	WGS
Brilliant Opaline	Gb.	
Brilliant Orange G.....	A, Kchl.....	WGS, SS
Brilliant Orange O, R.....	Kchl	WGS, SS
Brilliant Orcelleine, pat.....	Math	WGS
Brilliant Orseille C.....	Math	WGS
Brilliant Ponceau G, GG.....	Math	WGS
Brilliant Ponceau 4R.....	By	WGS
Brilliant Ponceau 5R.....	Bs, By, Math.....	WGS
Brilliant Purpurine 10B.....	A	CD
Brilliant Purpurine R.....	A, By, Kchl.....	CD
Brilliant Purpurine 4R.....	R F.....	CD
Brilliant Purpurine 5B.....	RF	CD
Brilliant Red	Sch	WGS
Brilliant Red D.....	Klp	WGS
Brilliant Red, for leather	Math.	
Brilliant Red Congo G.....	A, By, Kchl.....	CD
Brilliant Red 2038 T.....	Math	WGS
Brilliant Rubine O.....	Kchl	WGS, SS
Brilliant Saffranine G.....	A	WGS, CT

LIST OF DYESTUFFS, MAKERS AND METHODS. 301

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Scarlet	Lev.	
Brilliant Scarlet B, 2B, 3B, 5B, 7B....	SW	WGS
Brilliant Scarlet G, GG, R, RR, 3R, 4R, 6R, T.....	Math	WGS
Brilliant Scarletine	H	WGS
Brilliant Sky Blue G.....	Bs	CD
Brilliant Sulfon Azurine R.....	By ⁴	
Brilliant Sulphon Red B.....	S	WGS
Brilliant Wool Blue B extra.....	By	SS, WGS
Brilliant Yellow	A, By, Kchl, SB, SCH, tM	WGS, SS
Brilliant Yellow I.....	H	WGS
Brilliant Yellow S.....	PK	WGS, SS
Bromofluoresceic Acid Crystals.....	Kchl	Lakes
Bromofluoresceic Acid Crystals B.....	Kchl	Lakes
Bromofluoresceic Acid AG, A3G, A6G	Kchl	Lakes
Bromofluoresceic Acid AL.....	Kchl	Lakes
Bromofluoresceic Acid BA Crystals....	Kchl	Lakes
Bromofluoresceic Acid BL Blue.....	Kchl	Lakes
Bromofluoresceic Acid BL Yellow....	Kchl	Lakes
Bronze Diamine G.....	Math	CD
Brown A.....	Kchl	WG, SA
Brown BBX.....	BrS	CD
Brown JE, JEEE.....	P	WGS
Brown M.....	P	WGS
Brown N.....	P	WGS
Brown SC.....	S W	CD
Brown SDM, SDP.....	S S	CD
Brown Y.....	S W	CD
Brown for Leather O.....	Kchl	
Buffalo Black 4B, 8B.....	Sch	WGS
Buffalo Brown R.....	Sch	CT
Buffalo Bordeaux.....	Sch	CD
Buffalo Crimson B.....	Sch	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Buffalo Rubine	Sch	CD
Buffalo Scarlet 4B.....	Sch	CD
Buffalo Violet 4R.....	Sch	CD
Butter Yellow.		
Cachou de Laval S.....	P	Sulphur
Cachou Diamine	Math	CD
Calico Yellow, GG, 3G, 4G.....	Kell	Printing
Campanuline	A	CD
Canarine	Klp.	
Capri Blue GN.....	By, Kchl	CT
Capri Green B, G, GG.....	Kchl	CT
Carbazol Yellow W.....	P K	CD
Carbid Black, BO, R. RO.....	Klp	CD
Carbon Black BW.....	K	CD
Cardinal	Kchl	WG, SA, CT
Cardinal B, extra	SW	CD
Cardinal Red S.....		
Carmoisine	A, By, PK, SS....	WGS
Carmoisine conc.....	A, K, SS.....	WGS
Carnotine	ClCo	CD
Caroubier	Klp.	
Catechu Brown FK, FDK, GK.....		
Catechu 2GK.....		
Cattu Italiano		
Cerasine	Klp.	
Cerasine Blue LC.....	Math.	
Cerasine Orange G.....	Math.	
Cerasine Red, A.....	Math.	
Cerasine Yellow, G T.....	Math.	
Cerise	Bt, Kchl, Klp, Math, NI, PK, PS, SS WG, SA, CT	
	C J.	
Ceretine Orange C, extra.....	O	WGS
Chestnut Brown	A	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 303

Name of Dye.	Agent or Maker.	Dye Method.
Chicago Blue B, 4B, 6B, R, 2R, 4R, RW.A		CD
Chicago Gray	Kell	CD
Chicago Orange, G, extra, 3G.	A, BrS, By, PN, Kchl,	
China Blue	SS	CT
	Kchl	WGS, SS, CT
China Blue R, No. 1, 2.	Math.	
China Blue 71115	KB.	
China Green crystals	Kell.	
Chinoline Blue.	P K.	
Chinoline Green	A.	
Chinoline Red.	A,	
Chinoline Yellow.	BrS, By, Kchl, PN, WGS	
Chloramine Brown C, G.	By	CD
Chloramine Orange G.	By	CD
Chloramine Violet.	By	CD
Chloramine Yellow GG.	By	CD
Chlorantine Lilac	Klp, PK.	CD
Chlorantine Red 8B.	Klp	CD
Chlorazol Blue 6G, R, 2R.	H	CD
Chlorazol Brown A, B, C, R.	H	CD
Chlorazol Heiotrope.	H	CD
Chlorophenine G, O, R, Y.	ClCo	CD
Chlorophenine Orange, AA, R.	ClCo	CD
Chromanil Black RF.	A	CD
Chromanil Brown GG, R, 2G.	A	CD
Chromazine Violet	Sch	WCh
Chromazo Maroon	Sch	WCh
Chromazo Red RB.	Sch	WCh
Chromazo Yellow GR.	Sch	WCh
Chromazon Blue B, R	Kell	WGS
Chromazon Red	Kell	WGS
Chrome Azurine S.	S	WCh
Chrome Black	SW	WGS
Chrome Black, B, T.	Kchl	WGSch
Chrome Blue	By, Math.	WCh

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Name of Dye.	Agent or Maker.	Dye Method.
Chrome Blue B.....	Kchl	WCh
Chrome Blue 2B, 4B, BN, PE, R, 2R, 3R, No. 470.....	Kell	WCh
Chrome Bordeaux	By	WCh
Chrome Brown G.....	Kell	WCh
Chrome Brown BO, RO.....	Kchl	WCh
Chrome Fast Black B.....	A	WCh
Chrome Fast Black F.....	Klp	WGSCh
Chrome Fast Yellow G, 2G, R.....	A	WCh
Chrome Green	By	WCh
Chrome Leather Black B C.....	Math.	
Chrome Orange	By	WCh
Chrome Patent Black TB, TG, TR, T.....	K	WGS
Chrome Prune	By	WCh
Chrome Red R.....	HS	WCh
Chrome Red paste	By	WCh
Chrome Ruby paste	By	WCh
Chrome Violet powder	By, Kell	WCh
Chrome Violet paste	By	WCh
Chrome Yellow	H S, N I	WCh
Chrome Yellow D.....	By	WCh
Chrome Yellow G.....	By, HS	WCh
Chrome Yellow P.....	Kell	WCh
Chromine G.....	K	WCh
Chromine Blue B, T.....	HS	WCh
Chromium Patent Black DG, DGG.....	K	WGSCh
Chromocyanine	DH	Printing
Chromotrop 2B, 6B, 8B, 10B, I, 2R.....	Kchl	WGS
Chromotrop FB, S, SB, SN, SR.....	Kchl	WGSCh
Chrysamine	By	CD
Chrysamine G.....	A, By, Kchl	CD
Chrysamine GG.....	By	CD
Chrysamine R.....	A, By, Kchl	CD
Chrysaniline		
Chrysoidine	A, By, K, Kchl, PK,	

LIST OF DYESTUFFS, MAKERS AND METHODS. 305

Name of Dye.	Agent or Maker.	Dye Method.
		WN, SA, CT
Chrysoidine AG, FF.....	Math	WN, SA, CT
Chrysoidine G.....	Kell, Klp,	WN, SA, CT
Chrysoidine R.....	Kchl, Kell, Klp, Math..	WN, SA, CT
Chrysoidine Y, YY.....	Kchl, Sch, Math	WN, SA, CT
Chrysoidine Brown	Math	WN, SA, CT
Chrysoine	Klp, Kchl, PK, SS, tM	
Chrysoline	Kell	WGS
Chrysophenine	A, By, Kchl.....	CD
Chrysophenine G.....	Kchl	CD
Cinereine	SS.	
Cinnabar Scarlet.....	BK.	
Cinnamine S.....	W.	
Cinnamon Brown	PS	WGS, CT
Citronine	BrS, Fl, Kchl, Klp, O,	SS
		WGS, SS
Citronine A.....	Kchl	WGS
Citronine AA, 2A, extra, AHE NE....	SS	SA
Citronine G, GOO, GOOO.....	O.	
Citronine NE.....	SS	SA
Citronine Diphenyl G.....	Kell	CD
Citronine Diphenyl GOO.....	O	SS
Claret Red.....	Sch	WGS
Claret Red B, 3B, G, GR, R, B extra		
O, S.....	Kchl	WGS, SS
Clayton Aurotine	ClCo.	
Clayton Carnotine.....	ClCo	WGS
Clayton Cloth Red	ClCo	WGS
Clayton Fast Gray D.....	ClCo	Sulphur
Clayton Red	ClCo.	
Clayton Yellow, G.....	ClCo	CD
Clematine	Kell	CT
Cloth Blue O.....	Kchl	WGS, SS, CT

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Name of Dye.	Agent or Maker.	Dye Method.
Cloth Brown reddish, yellowish.....	By, Kchl	WCh
Cloth Orange	By, Kchl.	
Cloth Red	Kchl	WCh
Cloth Red, see Stanley Red.....	ClCo.	
Cloth Red B.....	Bs, By, Kchl, O...	WCh
Cloth Red BA.....	A	WCh
Cloth Red 3B extra.....	By	WCh
Cloth Red BO, FRBO.....	O	WCh
Cloth Red G.....	By, Kchl, O.....	WCh
Cloth Red G extra, 3G extra.....	By	WCh
Cloth Red GA, 3GA.....	A	WCh
Cloth Red GO, 3GO.....	O	WCh
Cloth Red O.....	Kchl	WCh
Cloth Red OB.....	O	WCh
Cloth Red R.....	Bs	WCh
Cloth Scarlet G, R.....	K	WGS
Coccein 3B.....	SS	WGS
Coccin, B.....	Kchl	WGS
Cochineal Red A.....	P K.....	WGS
Cochineal Scarlet G.....	Sch	WGS
Cochineal Scarlet PS.....	By	WGS
Cochineal Scarlet 2R, 4R.....	Sch	WGS
Cochineal Substitute	Klp	WGS
Coelestine Blue B.....	By	CT
Coeruleine AB, S.....	Kchl	WCh
Coeruleien S powder or paste.....	By, Kchl, Klp, PK,	WCh
Coeruleine SW, powder or paste	By, Kchl.....	WCh
Columbia Black B, BB, FB, R, FF.....	A	CD
Columbia Blue G, R.....	A	CD
Columbia Brown R.....	A	CD
Columbia Chrome Black BB.....	A	CD
Columbia Fast Blue 2G.....	A	CD
Columbia Fast Scarlet 4B.....	A	CD
Columbia Green	A	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 307

Name of Dye.	Agent or Maker.	Dye Method.
Columbia Orange R.....	A	CD
Columbia Red 8B.....	A	CD
Columbia Violet R.....	A	CD
Columbia Yellow	A	CD
Concentrated Cotton Blue R, 2R, 1, 2.		
3, 4.....	Kchl	WGS, SS, CT
Congo	A, By, Kchl...	WN, CD
Congo B.....	SS.	
Congo BB.....	A, By.....	CD
Congo 3B, BX, 2BX.....	A.	
Congo G R.....	A, By.	
Congo Blue BX, R.....	A	CD
Congo Brown G, R.....	A	CD
Congo Corinth B, G.....	A, By.....	CD
Congo Fast Blue B, R.....	A	CD
Congo GR.....	A, By.....	CD
Congo Orange G.....	A	CD
Congo Orange R.....	A, By, Kchl.....	CD
Congo P, Pure Blue	A	CD
Congo 4 R.....	A, By, Kchl.....	CD
Congo Red	Klp	CD
Congo Rubine	A	CD
Congo Violet	A	CD
Congo Yellow paste	A. By.....	CD
Congress Red FEN.....	NI	CD
Copper Black S.....	Kchl	WGS, Dev
Copper Blue B, B extra.....	Kchl	WGS, Dev
Coralline	LP.	
Coreine, AB, AR, RR.....	Klp	WCh
Cotton Black B, 3B.....	PK	CD
Cotton Blue	Bs, Kchl.....	CAe
Cotton Blue B, 2BR.....	SW	CT
Cotton Blue BI.....	HS	WGS, CAe
Cotton Blue 3B, 6B extra.....	Kell.	
Cotton Blue O.....	O	CT

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Name of Dye.	Agent or Maker.	Dye Method.
Cotton Blue OO extra.....	Kchl, O...	WGS, SS, CT
Cotton Blue R.....	PK, SS.....	CT
Cotton Bordeaux	PK.	
Cotton Brown	PK.	
Cotton Brown 3G, R.....	ClCo.	
Cotton Brown N.....	Math	CD
Cotton Brown R, G.....	P K.....	CD
Cotton Dark Brown B.....	A C.....	CD
Cotton Green CG.....	A	CD
Cotton Navy Blue CR.....	AC	CD
Cotton Orange G, R.....	P K.....	CD
Cotton Ponceau	BK.	
Cotton Red, 4B.....	P K.....	CD
Cotton Scarlet	PK	CAe
Cotton Scarlet 3B.....	Sch, K.....	CAe
Cotton Scarlet O.....	Kchl Wn, SA, CT	
Cotton Scarlet, yellowish.....	Math	SA, CT
Cotton Yellow G, GB, R.....	PK	CD
Cresotine Yellow G, R.....	A, By, O.....	CD
Cresyl Blue BB, 6B, BBSO, RR.....	Bs	CT
Cresyl Fast Violet B, BB.....	Kchl.	
Cresyl Green GG.....	Bs	CT
Cresyl Violet BB.....	Bs	CT
Criterion Blue.....	At	WGS
Croceine AZ, X.....	Math.	
Croceine B, 3B.....	Sch	WGS, SS
Croceine 3BX	By, K.....	WGS
Croceine Orange	By, K.....	WGS
Croceine Orange 72269.....	Math	WGS
Croceine Scarlet 3B.....	Sch, By K....	WGS, CD
Croceine Scarlet 4BX.....	K	WGS
Croceine Scarlet 7B.....	By	WGS
Croceine Scarlet 8B.....	By, K.....	WGS
Croceine Scarlet 10B.....	By	WGS
Croceine Scarlet O extra.....	K	WGS

LIST OF DYESTUFFS, MAKERS AND METHODS. 309

Name of Dye.	Agent or Maker.	Dye Method.
Cross Dye Black B, 4B, 6B.....	RH	CD
Cross Dye Drab	RH	CD
Crow Black	Kchl, PK.....	CD
Crumpsall Direct Fast Brown B, M, O. Lev	Lev	CD
Crumpsall Fast Yellow YYFD.....	Lev	CD
Crumpsall Yellow	Lev	WGS
Crystal Ponceau	A, PK.....	WGS
Crystal Ponceau 6R	Kchl, Math.....	WGS
Crystal Scarlet 6R.....	Kchl, Math ..	WGS, SS
Crystal Violet 5B.....	Math.	
Crystal Violet 5BO.....	Klp	WGS, SS, CT
Crystal Violet O.....	Kchl, PK.....	WN, SA
Cuba Black R.....	SW	CD
Cumassi Black	Lev.	
Cumassi Mauve Blue	Lev.	
Cumidine Ponceau	A, PK.....	WGS
Cumidine Red	A, PK.....	WGS
Cupranil Brown B R.....	Klp	CD
Curcumeine extra	A	WGS
Curcumine	O	WGS, SS
Curcumine S, S extra.....	A, By, Kchl.....	CD
Curcumine Substitute	SS	WGS
Curuphenine	ClCo	WG
Cutch Brown D.....	Kchl, N...WG, SA, CT	
Cutch Brown D.....	ClCo	CD, WGS
Cutch Brown G.....	Kchl	WG, SA, CT
Cutch Brown GG.....	BrS	CD
Cutch Brown O, R, VY.....	ClCo	CD, WGS
Cyanine B.....	Kchl	WGS, SS
Cyanol extra, BB, FF, C.....	Math	WG
Cyanole Green B, CG, 6G.....	Math	WGS
Cyanosine	Klp.	
Cyanosine alcohol soluble	Kchl.	
Cyklamine	Mo	WG, SA
Cyprus Blue R.....	A	WGS Copper

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Name of Dye.	Agent or Maker.	Dye Method.
Cyprus Green B.....	A	WGS Copper
Dahlia		WGS, SS, CT
Dahlia for white	Kell	SS
Dark Blue	Kchl, PK.....	WGS
Dark Brown	SW	CD
Dark Brown M, MB.....	Kchl	WG, SA, CT
Dark Green	PK	WGS
Dark Green 682.....	BrS	CD
Deep Wool Black 2B, 3B.....	A	WG
Delphin Blue B, B conc.....	S, Kchl.....	WCh
Delta Purpurine 5B.....	By, Kchl.....	CD
Delta Purpurine 7B.....	A, By, Kchl.....	CD
Delta Purpurine G.....	By	CD
Diamine Azo Black B, BB pat.....	Math	CD
Diamine Azo Blue 54, 5, 154, 72, 918, 72, 122 pat.....	Math	CD
Diamine Azo Blue R, RR, pat.....	Math	CD
Diamine Black B, BH, BO, HW, RO, RMW, 72303, 72300J, 74302J, 75170J, 75171J.....	Math	CD
Diamine Black Blue B.....	Math	CD
Diamine Black Green N.....	Math	CD
Diamine Blue B, 2B, 3B, BG, BX, C4B, 6G, C4R, LG, C2R, LR, NC, RW, 3R, SRX, 50, 52, 53, 55, 41122, 72918, 72122, 72473, 72122, 74287, 74242, 74242J, 15 AB, AZ.....	Math	CD
Diamine Blue Black E, 72592, R, RL..	Math	CD
Diamine Bordeaux B, S.....	Math	CD
Diamine Brilliant Blue G.....	Math	CD
Diamine Brilliant Scarlet S.....	Math	CD
Diamine Brownze B, C, SF.....	Math	CD
Diamine Brown B, GG, 3G, M, OO, QQ, V, 1100, 3833, 30a, 31, 32, 33, 34, 35, 36, 37, 74290xJ, 74481JS.....	Math	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 311

Name of Dye.	Agent or Maker.	Dye Method.
Diamine Catechine B, G, pat. 3G.....	Math	CD
Diamine Catechu	Math	CD
Diamine Cutch	Math	CD
Diamine Cyanine B, 3B, R.....	Math	CD
Diamine Dark Blue B, R.....	Math	CD
Diamine Dark Green.....	Math	CD
Diamine Deep Black Cr, pat.....	Math	CD
Diamine Deep Black RB, SS, OOOO...	Math	CD
Diamine Deep Blue RB.....	Math	CD
Diamine Deep Dark Blue B, R.....	Math	CD
Diamine Fast Blue C.....	Math	CD
Diamine Fast Brown G.....	Math	CD
Diamine Fast Red, F.....	Math	CD
Diamine Fast Yellow A, AR, B, FF...	Math	CD
Diamine Gold	Math	CD
Diamine Gold Yellow	Math	CD
Diamine Gray G.....	Math	CD
Diamine Green B, G.....	Math	CD
Diamine Heliotrope G.....	Math	CD
Diamine Jet Black CR, OO, 40, RB, SE, 72530, SOOO.....	Math	CD
Diamine Milling Black B, FG extra..	Math	CD
Diamine New Blue G, P, R.....	Math	CD
Diamine Nitrazol Black, B.....	Math	CD
Diamine Nitrazol Brown B, BD, T, G, RD	Math	CD
Diamine Orange D, DC, G, GC, R, B..	Math	CD
Diamine Pink BD, B extra	Math	CD
Diamine Pure Blue, A, FF.....	Math	CD
Diamineral Black B, 3B, 6B.....	Math	CD
Diamineral Blue R.....	Math	CD
Diamineral Brown G.....	Math	CD
Diamine Red B, 3B, 10B, D, NO, 72732	Math	CD
Diamine Rose RD, B extra, BG GD, GGN	Math	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Diamine Scarlet B.....	Math	CD
Diamine Scarlet 3B.....	HS, Math	CD
Diamine Sky Blue, FF.....	Math	CD
Diamine Steel Blue L.....	Math	CD
Diamine Violet N.....	Math	CD
Diamine Violet Red.....	Math	CD
Diamine WO.....	Math	CD
Diamine Yellow N, paste, R paste.....	Math	CD
Diaminogene B, BR, CF, extra.....	Math	CD
Diaminogene Blue BB, G, RA, 2RA.....	Math	CD
Diamond Black F, NG, GA, FB.....	By	WGSCh
Diamond Brown R, 3R.....	By	WGSCh
Diamond Fast Acid Black	Me.	
Diamond Fast Blue, Red Yellow.....	Me.	
Diamond Flavine G.....	By	WCh
Diamond Green SS.....	Mo, By	WGSCh
Diamond Green B, G.....	PK.	
Diamond Green crystals.....	K B.	
Diamond Orange paste	By.	
Diamond Yellow paste G, R.....	By	WCh
Dianil Black AC.....	Kchl	CDv
Dianil Black CB, CR.....	Kchl	CDv
Dianil Black E.....	Kchl	CDv
Dianil Black G.....	Kchl	CDv
Dianil Black HW.....	Kchl	CD
Dianil Black W.....	Kchl	CD
Dianil Black PG, PR.....	Kchl	CDv
Dianil Black R.....	Kchl	CDv
Dianil Black RN.....	Kchl	CD
Dianil Black T.....	Kchl	CDv
Dianil Blue DB, DBX.....	Kchl	CD
Dianil Blue E, ET.....	Kchl	CD
Dianil Blue G.....	Kchl	CD
Dianil Blue R, 2R, 3R, 4R.....	Kchl	CD
Dianil Brown B, BD.....	Kchl	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 313

Name of Dye.	Agent or Maker.	Dye Method.
Dianil Brown D.....	Kchl	CD
Dianil Brown G, 2G, 3GO, 3GI.....	Kchl	CD
Dianil Brown M.....	Kchl	CD
Dianil Brown R.....	Kchl	CD
Dianil Brown X.....	Kchl	CD
Dianil Claret B, G.....	Kchl	CD
Dianil Dark Blue R, 3R.....	Kchl	CD
Diamil Direct Yellow S.....	Kchl	CD
Dianil Indigo O.....	Kchl	CD
Diamil Japonine G.....	Kchl	CD
Dianil Orange F, G, O.....	Kchl	CD
Dianil Red 4B.....	Kchl	CD
Dianil Scarlet G, 2R.....	Kchl	CD
Dianil Yellow G, 3G, R, OO.....	Kchl	CD
Dianisidine Blue	By, Kchl.....	Printing
Dianol Black Brown		
Dianol Brilliant Red extra	Lev.	
Dianol Brown NB, R, Y, YY.....	Lev.	
Dianol Olive	Lev.	
Dianthine, B, G.....	Lev	CD
Dianthine Pink	BrS	CD
Diazethyl Black B, R.....	By	CD
Diazine Black	Brs, Kell.	CD
Diazine Blue B, 2B, R.....	K	CT
Diazine Brown	K, SW.	CT
Diazine Green	K	CT
Diazo Black	K	CT
Diazo Black 2B, BHN, 3B, G, R.....	Kell	CD
Diazo Blue B.....	By	CDv
Diazo Blue Black RS.....	By	CDv
Diazo Bordeaux.....	By	CDv
Diazo Brilliant Black B, R.....	By	CDv
Diazo Brown G.....	By	CDv
Diazo Brown R extra, V.....	Bv	CDv
Diazo Deep Blue BB, 3B.....	By	CDv

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Name of Dye.	Agent or Maker.	Dye Method.
Diazo Indigo Blue B, M, BR extra.....	By	CDv
Diazo Navy Blue 3B.....	By	CDv
Diazo Alizarine Red RN.....	By	
Diazo Fast Black	Bai	WGS
Diazo Fast Black BXH, 3B, G.....	By	CD
Diazo Fast Black H.....	Kchl.	
Diazo Violet R.....	By	
Diazogene B, BB, 3B.....	By	
Diazurine B, G.....	Kell.	
Diazyl Black	By	CD
Diazyl Brown G, T.....	Bs	CD
Dimethyl Orange	Bs	CD
Dingley Blue B, 2R.....	Sch	CD
Dingley Yellow 17.....	Math.....	WGS, SS
Dioxine	Sch	CD
Diphen Blue B Base, R Base.....	A	CT
Diphenylamine Blue	Kchl.	
Diphenylamine Orange.....	Klp.	
Diphenyl Black B, DBB, ERF, 3G, R, RR	Kell	CD
Diphenyl Blue B, 2B, BM, DBB, EFR, EFS, 3G, NT, RR.....	Kell	CD
Diphenyl Blue Black.....	Kell	CD
Diphenyl Brown B, BY, CB, CG, CGG, R, RR, Y, 3G.....	Kell	CD
Diphenyl Chrysoine RR, 3G.....	Kell	CD
Diphenyl Catechine G, R, B.....	Kell	CD
Diphenyl Citronine G.....	Kell	CD
Diphenyl Dark Blue R.....	Kell	CD
Diphenyl Fast Black.....	Kell	CD
Diphenyl Fast Brown G.....	Kell	CD
Diphenyl Fast Black	Kell	CD
Diphenyl Fast Yellow G, GG.....	Kell	CD
Diphenyl Grey	Kell	CD
Diphenyl Green G, GB, 3G, KCG.....	Kell	CD
Diphenyl Indigo Blue	Kell	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 315

Name of Dye.	Agent or Maker.	Dye Method.
Diphenyl Orange GG, RR, ORW.....	Kell	CD
Diphenyl Red 8B.....	Kell	CD
Diphenyl Violet R, BC.....	Kell	CD
Diphenyl Yellow, R, GG, 3G.....	Kell	CD
Direct Black B.....	SS	CD
Direct Black BFG.....	A	CD
Direct Black GBN, K, G.....	Klp	CD
Direct Black R.....	SS	CD
Direct Black X.....	Bs	CD
Direct Black BK.....	Klp	CD
Direct Black DR, X.....	Bs	CD
Direct Black No. 8.....	A C	CD
Direct Black No. 5062.....	At	CD, CDv
Direct Blue B.....	K, Kchl, Klp, SW	CD
Direct Blue 2B.....	SS	CD
Direct Blue 3B.....	Jy	CD
Direct Blue 3BN.....	K	CD
Direct Blue 3BX.....	SS	CD
Direct Blue 5B.....	HS	CD
Direct Blue G, G 97.....	SW	CD
Direct Blue GR.....	Kchl	CD
Direct Blue NB.....		
Direct Blue O.....		
Direct Blue R.....	Klp, SW	CD
Direct Blue 2R, 3B, 2R.....	Jy, SS	
Direct Blue 5093.....	S W	CD
Direct Blue Black 2B.....	By	CD
Direct Brilliant Blue B.....	S W	CD
Direct Brilliant Orange BO.....	L	CD
Direct Brilliant Orange M.....	Mhy	CD
Direct Brown BB.....	Bs	CD
Direct Brown BL.....	BL	CD
Direct Brown BS, GS, RS.....	Kell	CD
Direct Brown GG.....	By	CD
Direct Brown GX.....	Bs	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Direct Brown J.....	Klp	CD
Direct Brown M.....	S S	CD
Direct Brown NX.....	Bs	CD
Direct Brown RD, 35.....	BL	CD
Direct Brown R, S.....	Kell	CD
Direct Brown RS.....	Kell	CD
Direct Brown S C.....	SW, CD.	
Direct Brown SDP.....	SS	CD
Direct Brown TB.....	Kchl	CD
Direct Brown TS, TSB.....	Klp	CD
Direct Brown VX.....	Bs	CD
Direct Brown 130, 131.....	H S	CD
Direct Brown 5002.....	SJW	CD
Direct Catechu Brown.....	NI	CD
Direct Dark Green	Kchl	CD
Direct Deep Black E, R, RW, T.....	By	CD
Direct Deep Red P.....	At	CD
Direct Fast Brown B, GG.....	By	CD
Direct Garnet A.....	BL	CD
Direct Gray	Jy, Kchl	CD
Direct Gray B.....	Klp, SS	CD
Direct Gray F.....	SW	CD
Direct Gray J.....	SS	CD
Direct Gray N.....	A C	CD
Direct Gray R.....	SS, Klp	CD
Direct Gray reddish	Klp	CD
Direct Gray 4R.....	SS	CD
Direct Green, CP.....	Klp	CD
Direct Green B, No. 276.....	A C, SS	CD
Direct Green BC.....	SW.	
Direct Green BX, S.....	B L	CD
Direct Green C, CB.....	Kchl, Kell	CD
Direct Green CY.....	Kell	CD
Direct Green G.....	Jy	CD
Direct Green P, A.....	Klp	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 317

Name of Dye.	Agent or Maker.	Dye Method.
Direct Green Y.....	Klp, SW.....	CD
Direct Green YYC.....	S W.....	CD
Direct Green 177, 228.....	H S.....	CD
Direct Indigo Blue A, BN.....	Klp	CD
Direct Indigo Blue RB.....	At	CD & CDv
Direct Indigo Blue BK.....	Klp	CD
Direct Lemon Yellow	Klp	CD
Direct Navy Blue C, SB.....	S W.....	CD
Direct New Blue 4B.....	A	CD
Direct Olive Y.....	S W.....	CD
Direct Orange	Fl.....	
Direct Orange G.....	H S.....	CD
Direct Orange KR, KY.....	Kell	CD
Direct Orange OR, R	Kell	CD
Direct Orange R.....	SS	CD
Direct Orange 2R.....	K	CD
Direct Orange Y.....	SS	CD
Direct Orange 12, 69.....	HS	CD
Direct Oriol Yellow	Kell	CD
Direct Pink	S W.....	CD
Direct Pink B.....	Jy	CD
Direct Plum	Jy	CD
Direct Red	A, By, Fl, Kell.....	CD
Direct Red B.....	Bs	CD
Direct Red C, B.....	A C.....	CD
Direct Red E, T.....	Kell	CD
Direct Red 5SE.....	Kell	CD
Direct Red No. 55.....	HS	CD
Direct Red extra	Jy	CD
Direct Safranine B.....	By	CD
Direct Salmon.....	At	CD
Direct Scarlet B, conc.....	K	CD
Direct Scarlet G.....	K	CD
Direct Scarlet R.....	K	CD
Direct Tan 5506.....	H S.....	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Direct Union Black.....	Jy.	
Direct Violet A, C.....	S W.....	CL
Direct Violet R.....	Jy	CD
Direct Violet 6 R extra	SS	CD
Direct Yellow	A, By, Fl, K, SS....	CD
Direct Yellow C.....	K SS.....	CD
Direct Yellow C, P.....	Klp	CD
Direct Yellow BSR, BLR.....	At	CD
Direct Yellow G.....	A C, K, SS.....	CD
Direct Yellow 2G, 3G.....	K	CD
Direct Yellow NW.....	B L.....	CD
Direct Yellow R.....	A C, By, S W.....	CD
Direct Yellow R extra.....	By	CD
Direct Yellow S.....	S W.....	CD
Direct Yellow T.....	Klp, S W.....	CD
Direct Yellow 443.....	FgB	CD
Direct Yellow 9673.....	Jy	CD
Domingo Chrome Black M.....	L	Special
Domingo Chrome Red G.....	L	Special
Domingo Chrome Yellow G.....	L	Special
Domingo Green 3G, H.....	L	WCh
Dominion Yellow O.....	At	CD
Double Brilliant Scarlet G, 2B, BR....	A	WGS
Double Brilliant Scarlet 3 R.....	By	WGS
Double Green S, F.....	K.....	
Double Ponceau 2R, 3R, 4R.....	By	WGS
Double Scarlet	K	WGS
Double Scarlet extra S.....	A	WGS
Double Scarlet G.....	tM	WGS
Double Scarlet R.....	Lev	WGS
Double Scarlet 2R.....	tM	WGS
Durophenine Brown V.....	Cl Co.....	CD
Eboli Blue	Bs	WG, CD
Eboli Blue B.....	L	CD
Eboli Green B, G.....	L, Klp.....	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 319

Name of Dye.	Agent or Maker.	Dye Method.
Ebony Black	Klp	CD
Ecarlate B	SS	CD
Ecarlate J, JJ, V.....	RF	WGS
Ecarlate Brilliante	R F	CD
Ecarlate Croceine 3B.....	Mo.	
Echurine	L M.	
Eclipse Black B.....	Kell	Sulphur
Eclipse Bronze.....	Kell	Sulphur
Eclipse Brown 5G.....	Kell	Sulphur
Eclipse Olive.....	Kell	Sulphur
Elgene Base B.....	A	CD
Elgene Blue.....	A	CT
Emerald Green Crystals.....	PK, Bt, By.....	WGS, SA, CT
Emin Red	A	WGS
Empire Black B, G.....	At	Wach
Empire Orange G.....	Bch,	
English Yellow		WGS
Eosamine B.....	A	WGS
Eosine A.....	P K.....	WA, SA
Eosine A conc, 2A, AG, A6G.....	Kchl	WA, SA
Eosine bluish.....	Kell	WA, SA
Eosine B.....	Klp, S W.....	WA, SA
Eosine BB.....	Klp	WA, SA
Eosine 3B.....	Kchl'	WA, SA
Eosine 10B, BF.....	Math	WA, SA
Eosine BN.....	Math, P K.....	WA, SA
Eosine DH, DHV.....	Klp	WA, SA
Eosine extra, extra yellow, extra conc. extra BB, AG, A, 3G, A5G, D.	Kchl	WA, SA
Eosine Bluish, extra yellow, yellow- ish	Kell	WA, SA
Eosine G.....	Math	WA, SA
Eosine GGB, GGF, GGG.....	Math	WA, SA
Eosine J.....	P K.....	WA, SA

Name of Dye.	Agent or Maker.	Dye Method.
Eosine 3J, 4J, extra.....	Kchl	WA, SA
Eosine JJJ.....	Math	WA, SA
Eosine MZ, MZA.....	Math	WA, SA
Eosine S.....	P K.....	WA, SA
Eosine Y.....	S W.....	WA, SA
Eosine 2110, 5765, 02021.....	Math	WA, SA
Eosine Scarlet B.....	Math	WA, SA
Eosine Scarlet BB extra.....	Kchl, Kell....	WA, SA
Eosine Yellowish.....	A, BrS, K....	WA, SA
Erie Blue GG	A	CD
Enie Green 235, DB.....	Sch	CD
Erika B, BN, B ex.....	A	CD
Erika G, G ex.....	Lev	CD
Erika 3GN, 2GN.....	A	CD
Erio Blue BB, G, R, RR.....	Kell	WGS
Eriocyanine	Kell	WGS, SS
Erioglaucine	Kell	WGS, SS
Erytherine X	P K.....	SS
Erythrine C	Math.....	
Erythrosine	Br S, Klp, PK....	WA
Erythrosine	Kchl, PK.....	WA
Erythrosine bluish, yellowish	Kell	WA
Erythrosine AG.....	Kchl	WA
Erythrosine B, BB.....	A	WA
Erythrosine blue shade	Kchl	WA
Erythrosine BNT, D, DS.....	Math	WA
Erythrosine extra	Kchl	WA
Erythrosine G.....	P K.....	WA
Erythrosine yellow shade	Kchl, Math.....	WA
Erythrosine 694	S W.....	WA
Ethyl Blue BF.....	Kchl	CT
Ethyl Blue BD, RD.....	Kchl	Printing
Ethylene Blue, B, G, R, RR.....	O.....	
Ethyl Eosine		
Etanl Green	A, Bt.....	WGS, SS

LIST OF DYESTUFFS, MAKERS AND METHODS. 321

Name of Dye.	Agent or Maker.	Dye Method.
Ethyl Purple 6B.....	P K.....	WGS
Excelsior Lake Scarlet JN, 2JCN.....	Math	WGS
Excelsior Black	Math	WGS
Excelsior Black B, G, 5G.....	SW	WGS
Fast Acid Blue B.....	By	WGS
Fast Acid Blue R, R conc.....	Kchl	WGS, SS
Fast Acid Eosine G, G extra.....	Kchl	WGS
Fast Acid Fuchsine B.....	By	WGS
Fast Acid Green B, BN, BS, BZ.....	Math	WGS
Fast Acid Phloxine A, A extra	Kchl	WGS
Fast Acid Ponceau	Klp	WGS
Fast Acid Red A.....	Kchl	WGS
Fast Acid Red B.....	Kchl, PK.....	WGS
Fast Acid Scarlet	Klp	WGS
Fast Acid Violet A2R.....	Kchl	WGS, SS
Fast Acid Violet B.....	Kchl	WGS, SS
Fast Acid Violet 10B.....	By	WGS
Fast Acid Violet R.....	Kchl	WGS, WCh
Fast Azo Grenat	Kchl	WGS
Fast Belgian Blue	A C.	
Fast Black	Kchl.	
Fast Black B, BS.....	P K.	
Fast Black D.....	S W	CD
Fast Blue	BrS.	
Fast Blue B for wool.....	A, Kchl, PK.....	WGS
Fast Blue for Cotton, B, 3B, 3R.....	Kell,	CT
Fast Blue for Cotton, B, 2B, 3B, 4Bm,		
5B, 6B.....	Kchl	CT
Fast Blue for Cotton R, 2R, 3R, RB...	Kchl	CT
Fast Blue 2B for Cotton.....	A, NI, SS.....	CT
Fast Blue 5B greenish.....	Kchl	WGS
Fast Blue 6B for wool.....	A	WGS
Fast Blue BN.....	Math	WGS
Fast Blue BBH.....	L	CT
Fast Blue Black paste.....	Kchl	CT

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Name of Dye.	Agent or Maker.	Dye Method.
Fast Blue Black M paste.....	Kchl	CT
Fast Blue C.....	Jy.	
Fast Blue D.....	Kchl	WGS
Fast Blue EL.....	O.	
Fast Blue E, E000.....	O	WGS
Fast Blue extra greenish.....	Kchl	WGS
Fast Blue FS	Kchl	WGS
Fast Blue G.....	Bd, Bt	WGS
Fast Blue G extra.....	Kchl	WGS
Fast Blue greenish.....	Kchl, P K.....	WGS
Fast Blue 6G.....	Math	WGS
Fast Blue N.....	SW	WGS
Fast Blue NG, NR.....	O	WGS
Fast Blue O, OO.....	Kchl, Klp.....	WGS
Fast Blue OOO.....	O	WGS
Fast Blue R for cotton crystals.....	A	CT
Fast Blue 3R for cotton crystals.....	Kchl	CT
Fast Blue R.....	A, Kchl, Math, PK..	WGS
Fast Blue 2R, 3R, 5R, No. 60.....	A, Kchl, Math, PK..	WGS
Fast Blue, RAD, RD, RRD.....	Math	WGS
Fast Blue	Kchl	WGS
Fast Blue III R.....	S	CT
Fast Bordeaux O.....	Kchl	WCh
Fast Brown 3B, G.....	A	WGS
Fast Brown N.....	P K	WGS
Fast Brown ONT yellowish.....	Kchl	WGS, SS
Fast Brown R.....	Kchl, PK	CD
Fast Brown 25.....	A, Math	WGS
Fast Claret	HS, Klp	WGS
Fast Claret Red O.....	Kchl	WGS, SS
Fast Cotton Blue B, 3B, R, RR, 3R.....	Kchl	CT
Fast Cotton Brown R.....	Kell	CD
Fast Cotton Orange 6R extra.....	Bs	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 323

Name of Dye.	Agent or Maker.	Dye Method.
Fast Cotton Yellow 6G, extra, O,R, R exBs		CD
Fast Diamine Yellow ARR.	Mhy	CD
Fast Direct Blue	Bt	CD
Fast Direct Blue G.	Bs	CD
Fast Direct Brown BB, G.	Bs	CD
Fast Fulling Blue RR.	Klp	WCh
Fast Gray B, R.	O	CT
Fast Green	By, NI.	WGS, SS, CT
Fast Green No. 12, paste.	Kchl	WCh
Fast Green No. 16.	Kchl	WCh
Fast Green Crystals O.	Math.	
Fast Green extra, extra bluish.	By	WGS
Fast Green B, CR.	Math.	
Fast Green B.	Bs	WACH
Fast Green CR.	By	WGS
Fast Green M, SS.	Klp	Printing
Fast Indigo Blue R.	K	WGS
Fast Light Green	By	WGS
Fast Light Yellow, 3G.	By	WGS
Fast Mordant Yellow G.	P K	CT
Fast Navy Blue A, G.	O	CT
Fast Navy Blue GM.	K	WGS
Fast Navy Blue M.	S W.	
Fast Navy Blue MM.	K	CT
Fast Navy Blue RA.	O	CT
Fast Navy Blue RM.	K	CT
Fast Navy Blue RN.	O	CT
Fast Neutral Violet B.	Math	CT
Fast New Blue for Cotton		
Fast Orange	SW	CD
Fast Orceine.	At	WGS
Fast Pink B.	Klp	CD
Fast Pink for Silk.	Klp.	
Fast Ponceau B, 2B.	P K.	WGS

Name of Dye.	Agent or Maker.	Dye Method.
Fast Red.....	CDC, A, Kchl, Klp..	WGS
Fast Red A.....	A, By, K, O, PK..	WGS
Fast Red B.....	NI, PK	WGS
Fast Red BT.....	By, Klp	WGS
Fast Red C.....	P K.....	WGS
Fast Red D.....	O, PK	WGS
Fast Red E.....	By, PK	WGS
Fast Red E, B.....	PK, Bs	WGS, SS
Fast Red extra.....	Kell	WGS, SS
Fast Red 7B.....	NI.	
Fast Red NS.....	By	WGS, SS
Fast Red O.....	Kchl	WGS
Fast Red R.....	AC	WGS
Fast Red RC.....	SW	WGS
Fast Red RR, RY.....	PK	WGS
Fast Red S.....	Kchl	WGS, SS
Fast Scarlet, B.....	K	WGS
Fast Silk Gray O.....	Kchl	SS
Fast Sulphon Violet 4R, 5BS.....	S	WGS
Fast Violet	Klp	WCh
Fast Violet B.....	Kchl	WCh
Fast Violet bluish, reddish.....	By	WGS
Fast Wool Blue A.....	A	WGS
Fast Yellow	BrS, By, Math, Pk.	WGS
Fast Yellow C.....	SW	WGS
Fast Yellow G.....	K, Klp.	
Fast Yellow greenish.....	Bs	WGS
Fast Yellow M.....	B L	WGS
Fast Yellow R.....	K	WGS
Fast Yellow S.....	Math, Kchl	WGS
Fast Yellow 4S.....	SS	WGS
Fast Yellow TS.....	Kchl	CD
Fast Yellow, 1, 2.....	SW	CD
Fast Yellow 272.....	SW	WGS

LIST OF DYESTUFFS, MAKERS AND METHODS. 325

Name of Dye.	Agent or Maker.	Dye Method.
Fat Ponceau	Kchl.	
Filling Blue	Klp	WCh
Fine New Green Crystals.....	Bt.	
Fine Violet	Bt.	
Firn Blue	Klp	WGS, SS, CT
Flavazine S, L.....	Kchl	WGS
Flavazol	A	WGS
Flavinduline	P K	CT
Florida Red, B, G.....	L	WGS
Fluoresceine	Kchl, Klp, Math, Pk...	WGS, SS
Fluoresceine G, R, 6836.....	Math	WGS, SS
Fluorescent Blue	Klp, SS.	
Formyl Blue B.....	Math	WGS
Formyl Violet 4B, 6B, 8B, 10B, S4B,	Math	WGS
S5B	By	WGS
Fram Blue G.....	Bs, By, Kchl, Klp, Math, O, PK, NI, PS	WG, SS, CT
Fuch sine	P.	
Fuch sine A	SS	WG, SS
Fuch sine BOO, JOO.....	SW	WG, CT
Fuch sine Crystals 685.....	Sch	WG, CT
Fuch sine F, COOB.....	PK	WG, SS
Fuch sine S.....	Kchl	WGS, SS, CT
Full Blue O.....	Klp	WCh
Fulling Black	K	WCh
Fulling Blue	Kell	WGS
Fulling Blue G, R.....	Bs, Kchl	WGS
Fulling Blue JB.....	Kchl	CDv
Fulling Brown JB, JR.....	Kchl	CDv
Fulling Green.....	At	—
Fulling Green JB, JG.....	Kchl	CDv
Fulling Green	At, Kchl.	
Fulling Red B.....	Math.	

Name of Dye.	Agent or Maker.	Dye Method.
Fulling Red B, FGG, FR, G.....	Bs.	
Fulling Red JB.....	Kchl	CDv
Fulling Red R.....	Bs	WCh
Fulling Yellow	Kchl	WGS
Fulling Yellow JG, JR.....	Kchl	CDv
Fulling Yellow O.....	Math	WGS
Fulling Yellow OO.....	By, Kell	WCh
Gallamine Blue.....	Kell	WCh
Gallanil Green.....	Klp	WCh
Gallanil Indigo P, PS.....	Klp	WCh
Gallazin A.....	Kchl	WCh
Gallein A paste, R paste, W powder...	By, PK, Kchl	WCh
Gallein paste.....	Kchl	WCh
Gallocyanine BS, DH.....	By, Kchl, PK	WCh
Gallocyanine paste.....	H.	
Gallocyanine paste D.....	A, K	WCh
Gambine	H	WCh
Gambine B, G, R, Y, YDS, Yellow....	Math	CT
Garnet	HS	WGS
Garnet 138.....	Math.	
Garnet 71031.....	A C	WCh
Geneva Blue, C, RR.....	A C	WCh
Geneva Brown.....	A.	
Gentian Blue 6R.....	Kell	CT
Gentianin	Math	WGS, CT
Geranium GN.....	By.	
Geranine BB, G.....	By, Kchl	CD
Germania Red.....	Klp	CT
Glacier Blue.....	Klp	WGS, SS, CT
Glaucol G.....	L	WGS
Gloria Black B.....	Math.	
Glycerine Blue, Corinth, Red.....	Ki	CD
Golden Brown	B L	CD
Golden Yellow.....	H	WGS
Gold Orange.....	Bs, By	WGS, CT

LIST OF DYESTUFFS, MAKERS AND METHODS. 327

Name of Dye.	Agent or Maker.	Dye Method.
Gold Orange for Cotton.....	Klp.	
Gold S, C.....	S W	CD
Gold Yellow.....	By	WGS, SS
Gold 83.....	Gt	CD
Granat Brown.....		
Gray B, R.....	Klp.	
Green resinate A, 7803.....	Math.	
Grenadine	Kchl, NI...	WG, SA, CT
Grenadine B, BB, G.....	O.	
Grenat S.....	P K.	
Guernsey Blue.....	Kchl, O.	
Guinea Bordeaux B.....	A	WGS
Guinea Carmine B.....	A	WGS
Guinea Green B, G, B extra.....	A	WGS
Guinea Red 4R.....	A	WGS
Guinea Violet 4B.....	A	WGS
Half Wool Black B, T.....	O	CWD
Half Wool Black S.....	Math	CWD
Half Wool Blue B.....	Kchl	CWD
Half Wool Blue G.....	Math	CWD
Half Wool Black S.....	Math.	
Havanna RF VB.....	Math	CT
Havanna Black TED.....	A C	CD
Havanna Blue DR, W.....	A C	CD
Havanna Brown CBB, O, No. 50, No. 61, B, YY.....	A C	CD
Helianthine	Kell, PK.....	WGS, SS
Heligoland Blue B, G, GA, GG, R, 2R..	Jy	CD
Heligoland Brown.....	NI	CD
Heligoland Red.....	NI	CD
Heligoland Yellow.....	NI	CD
Heliotrope	A, By, Kchl.....	WG, WGS, CD
Heliotrope Tannin.....	Math	CT
Heliotrope B.....	A, By, K, Kchl.....	CD

Name of Dye.	Agent or Maker.	Dye Method.
Heliotrope 2B.....	A, By, K, Kchl.....	CD
Helvetia Blue	Kell	WGS, CT
Hessian Acid Red L.....	L	CD
Helvetia Green.....	Bs.	
Hessian Blue.....	Kchl.	
Hessian Bordeaux.....	Kchl	CD
Hessian Brilliant Purple.....	A, By, Kchl.....	CD
Hessian Brown, BB, MM.....	Bs, Kchl	CD
Hessian Orange.....	L	CD
Hessian Purple, B, D. N.....	A, By, Kchl.....	CD
Hessian Violet.....	A, By, Kchl.....	CD
Hessian Yellow.....	A, By, Kchl.....	CD
Hoechst New Blue.....	Kchl	WGS
Hofmann's Violet.....	KB	WG, SS, CT
Hofmann's Violet N.....	SS	CT
Homophosphine G	Kchl	CT
Hydrazine Yellow O.....	O	WGS
Hyrdoleine Induline, Marine R, Primul.	RE.	
Immedial Black FF extra, G extra, NV		
extra, NB, NG, 2 extra.....	Math	Sulphur
extra	Math	Sulphur
Immedial Blue.....	Math	Sulphur
Immedial Blue C.....	Math	Sulphur
Immedial Bronze S.....	Math	Sulphur
Immedial Brown B.....	Math	Sulphur
Immedial Sky Blue.....	Math	Sulphur
Imperial Black.....	At	WGS
Imperial Green Crystals.....	Bt.	
Imperial Scarlet.....	By	WGS
Imperial Violet Crystals.....	At	WGS
Indamine Blue N, NB, N extra R....	Kchl	CT
Indamine Gray.....	NI.	
Indamine 3R, 6R, TD.....	NI	CT
Indanthrine X, S.....	PK	Printing
Indazine, M, MT, P.....	Math	CT

LIST OF DYESTUFFS, MAKERS AND METHODS. 329

Name of Dye.	Agent or Maker.	Dye Method.
Indazurine	B C F.	
Indian Yellow.....	By	WGS, SS
Indian Yellow G, R.....	Math	CD
Indigen Blue BB, R.....	Klp	CD
Indigene D, F.....	By.	
Indigo Blue N.....	Math	WG
Indigo Blue BNK.....	Klp	CD
Indigo Blue RB.....	S S.	
Indigo Blue SGN.....	Math	WGS
Indigo Powders 1006.....	H.	
Indigo Substitute B, BS, pat.....	Kchl	WGS, SS
Indigo Synthetic.....	B. M	Vat
Indigo Synthetic MLB, 20% paste, 100% powder.....	Kchl	Vat
Indigotine A, B.....	S W	WGS
Indigotine extra L, No. 150.....	Math	WGS
Indigotine extra L, and No. 1.....	Klp	WGS
Indigo Vat MLBI.....	Kchl	Dyeing
Indophenol White paste.....	Klp.	
Indophor	P K.	
Induline	Bs, By, Math, Kchl, PK.	
Induline B.....	K, S W.	
Induline BE.....	SS.	
Induline 6B.....	A.	
Induline B, R powder.....	Kchl	Printing
Induline NN.....	PK.	
Induline 2N, 2N greenish, S V.....	Kchl	WGS, SS
Induline R.....	K.	
Induline Red.....	SS	WGS
Induline Scarlet.....	P K	CT
Indumen Blue B.....	A C	WCh
Intense Blue.....	By	WGS
Iodine Eosine.....	Mo.	
Irisamine G.....	Math	CT
Iris Blue.....	P K.	

Name of Dye.	Agent or Maker.	Dye Method.
Iris Violet.....	P K.	
Iso Diphenyl Black B, BB, R.....	Kell	CD
Iso Rubin.....	A	WGS, SS, CT
Italian Green.....	ClCo	CD
Janus Blue B, R.....	Kchl	CDv
Janus Bordeaux B.....	Kchl	CDv
Janus Brown B, R.....	Kchl	CDv
Janus Claret Red B.....	Kchl	CDv
Janus Gray B, BB.....	Kchl	CDv
Janus Green B, G.....	Kchl	CDv
Janus Red B.....	Kchl	CDv
Janus Yellow G, R.....	Kchl	CDv
Jasmine	Kell	WGS, SS
Jet Black R.....	By	WG, WGS
Jute Black.....	Kchl, Math, O.	CT
Jute Black GN, G375, 8174.....	Math	CT
Katigene Black Brown.....	By	Sulphur
Katigene Black T, SW, 2B.....	By	Sulphur
Katigene Blue Black B, 4B, R.....	By	Sulphur
Katigene Chrome Blue SG, 5G, 2R.....	By	Sulphur
Katigene Chrome Brown.....	By	Sulphur
Katigene Indigo B.....	By	Sulphur
Katigene Olive, G.....	By	Sulphur
Kermesine Orange.....	Kchl	WGS
Keton Blue 4BN, G, R.....	Kchl	WGS, SS
Kiamensi Orange G, RR.....	At	CD
Kiton Blue.....	Klp	WGS
Kiton Green.....	Klp	WGS
Klondike Black 153.....	H S	CD
Klondike Black Brown.....	H S	CD
Klondike Blue 51, 71.....	H S	CD
Klondike Brown B, G, GG, No. 156.....	H S	CD
Klondike Olive Brown.....	H S	CD
Klondike Orange RR.....	H S	CD
Klondike Red.....	H S	CD

LIST OF DYESTUFFS, MAKERS AND METHODS. 331

Name of Dye.	Agent or Maker.	Dye Method.
Klondike Yellow GG, 3G, No. 162.....	H S	CD
Kresotine Yellow G, R.....	A, By, O.....	CD
Kresol Red.....	P K.	
Kryogene Black B, BA, G.....	PK	Sulphur
Kryogene Blue R.....	PK	Sulphur
Kryogene Brown B, G.....	P K	Sulphur
Kryogene Olive.....	PK	Sulphur
Lake Scarlet FR, FRR, FRRR, GG, 2R, 3R	Math	WGS
Lake Scarlet, GRH, GRCL, RL, 2RL, 2RCL, 3RCL, 3291.....	Kchl	WGS
Lanacyl Alizarine Blue 3B.....	Math	WA
Lanacyl Alizarine Violet R.....	Math	WA
Lanacyl Blue.....	Math	WGS
Lanafuchsine SB, SG, 6B.....	Math	WGS
Laundry Blue B, 1, 2, 3.....	Math	WGS, SS, CT
Lazuline Blue.....	By	WGS
Leather Black New.....	Math	143
Leather Black 4252, 6116.....	Math.	
Leather Black C.....	Kchl	Chrome
Leather Black T.....		Tannin
Leather Brown.....	Kchl, O	Tannin
Leather Yellow.....	Bs, Kchl, Klp...	Tannin
Light Blue.....	SS, tM.	
Light Green.....	K B.	
Light Green SF, bluish, yellowish.....	P K	WGS, SS
London Blue, extra.....	Br S.	
Luzon Black.....	At	WGS
Lyons Black.....	FGB	WGS
Lyons Blue O, R, RR.....	Kchl.	
Madison Blue V.....	At	C D & C Dv
Madras Blue B.....	At, FTM.	
Madras Blue G.....	SS	WGS
Madras Blue RR.....	At	WGS
Magdala Red.....	Kchl, Klp	SA

Name of Dye.	Agent or Maker.	Dye Method.
Magenta	H, Math, Sch.....	WG, SA, CT
Magenta Extra Large Crystals, extra yellow, Large Crystals, Small Crystals, Double Refined.....	Kchl	WG, SA, CT
Magenta Large Crystals B.....	Math	WG, SA, CT
Magenta I.....	Klp	WG, SA, CT
Magenta Crystals 80408.....	R H	CT
Malachite Green.....	A, K, Klp, Math	WN, SA, CT
Malachite Green B.....	Kchl, P K.....	WN, SA, CT
Malachite Green BB, 4B.....	Kchl	WN, SA, CT
Malachite Green crystals.....	Kchl, SW.....	WN, SA, CT
Malachite Green G.....	P K	WN, SA, CT
Malachite Green Ia.....	Kchl	WN, SA, CT
Malachite Green Superior.....	Kchl	WN, SA, CT
Malachite Green No. 12.....	Kchl	WN, SA, CT
Malachite Green Powder.....	Kchl, S W.....	WN, SA, CT
Malta Blue.....	SS	CT
Malta Gray.....	SS	CT
Malta Yellow AL.....	SS	CT
Malta Gray.....	S S	CT
Manchester Brown, EE, PS.....	Math	CT
Manchester Fellow.....	Lev. RD	WGS
Manhattan Black BS.....	A C.....	
Manila Brown, M15G.....	Sch	CD
Mandarine G extra, GR.....	A	WGS
Mandarine Orange G, extra.....	Kchl	WGS
Marine Blue BI, 2RX, RI.....	Kchl.....	WN, SA, CT
Marion Red.....	Kchl	Lakes
Maroon S.....	Kchl, PK.....	WGS, SS
Mars Red G.....	PK	
Martial Black B.....	SS.....	
Martius Yellow.....	Kchl.....	
Mazarine Blue B, BG, RNS.....	A C	WCh

LIST OF DYESTUFFS, MAKERS AND METHODS. 333

Name of Dye.	Agent or Maker.	Dye Method.
Mazarine Brown WO.....	A C	WCh
Mekon Yellow G, R.....	Klp	CD
Melanogen G, T.....	Kchl	Sulphur
Melanogen Black G, T.....	Kchl	Sulphur
Melanogen Blue B.....	Kchl	Sulphur
Mendola's Blue.....	.....	CT
Meridian Green B.....	At	CD
Meridian Violet 51.....	At	CD
Meridian Yellow 000.....	At	CD
Merino Blue, R.....	SS.	
Merino Brown.....	SS.	
Merino Yellow.....	SS.	
Metachrome Bordeaux.....	A	Special
Metachrome Brown B.....	A	Special
Metachrome Mordant.....	A	Special
Metamine Blue B, G.....	Klp	CT
Metanil Yellow	A, Bs, By, K, Kell, O, Kchl, PK	WGS
Metanil Yellow B, BB, R.....	Math	WGS
Metanil Extra Yellow G.....	Math	WGS
Metaphenylene Blue B, BB.....	Math	WGS
Metaphenyl Yellow ME.....	SS	WGS
Methyl Alkali Blue.....	K, Kchl, Kell, Klp, O, PK.	
Methyl Blue.....	Math, tM	SS, CT
Methyl Blue for Cotton.....	Kchl, O..	WGS, SS, CA1
Methyl Blue for Silk.....	Kchl, O.....	SS
Methyl Blue New.....	Kell.	
Methyl Blue GS.....	Math.	
Methyl Cotton Blue.....	Kell	CA1
Methyl Diphenylamine Blue.....	Kchl.	
Methylene Blue B.....	Kchl, Kell, O, PK.... .....WN, SA, CT	
Methylene Blue B conc.....	Kchl	WN, SS, CT
Methylene Blue BB, SCH.....	Sch. A, Kchl	
WN, SS, CT	

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Name of Dye.	Agent or Maker.	Dye Method.
Methylene Blue BB conc.....	Kchl	WN, SS, CT
Methylene Blue BB crystals.....	CR	WN, SS, CT
Methylene Blue BB, extra.....	Kchl	WN, SS, CT
Methylene Blue powder extra.....	A, PK	WN, SS, CT
Methylene Blue B, G B, ₄ H	PK	WN, SS, CT
Methylene Blue crystal, chem. pure...	Kchl	WN, SS, CT
Methylene Blue D, DB, DBB extra,	Kchl	WN, SS, CT
DBB extra conc, DR, extra D....	Kell	WN, SS, CT
Methylene Blue D, pure.....	O	WN, SS, CT
Methylene Blue G.....	Math	CT
Methylene Blue 4BEE.....	SS	CT
Methylene Blue 4BEESL.....	SS	Printing
Methylene Blue powder D, Powder I,		
R, RB, R conc, RR.....	Kchl	WN, SS, CT
Methylene Blue RR.....	O	WN, SS, CT
Methylene Blue 3R, 5R, 6R.....	Kchl	WN, SS, CT
Methylene Blue V.....	Kell	WN, SS, CT
Methylene Dark Blue 3BN, RBN, pat..	Kchl	WN, SS, CT
Methylene Gray B, BF, G, ND, NF, O,		
R	Kchl	WN, SS, CT
Methylene Green.....	Kell	WN, SS, CT
Methylene Green G, GG, O, extra yel-		
low, yellow conc.....	Kchl	WN, SS, CT
Methylene Heliotrope O.....	Kchl	WN, SS, CT
Methylene Indigo O.....	SS	WN, SS, CT
Methylene Violet.....	Kell, Klp ..	WN, SS, CT
Methylene Violet BN, RRA, RRAA....	Kchl	WN, SS, CT
Methyl Eosine.....	A, Klp	WGS, SS
Methyl Green.....	A, By, K, Math,	SS.
Methylindone B, R.....	Math.	
Methyl Violet B, 2B.....	A, By, Kchl, Math,	
	NI, O, PK, SW.....	
	.....	WG, SA, CT
Methyl Violet 2B, c. p.....	Kchl.....	WG, SA, CT

LIST OF DYESTUFFS, MAKERS AND METHODS. 335

Name of Dye.	Agent or Maker.	Dye Method.
Methyl Violet 2BC.....	SW	WG, SA, CT
Methyl Violet BO.....	Math	WG, SA, CT
Methyl Violet 3B.....	Kchl, Math, O, SW.	
Methyl Violet 3BD.....	Math	WG, SA, CT
Methyl Violet 3BO.....	Bch.	
Methyl Violet 4B.....	Kchl, Math, O	
	.....	WG, SA, CT
Methyl Violet 4BO.....	Math	WG, SA, CT
Methyl Violet 5B.....	Kchl, Math, O, SW...	
	.....	WG, SA, CT
Methyl Violet 6B.....	Kchl, Math, O, SW...	
	.....	WG, SA, CT
Methyl Violet 6BO.....	K, Kchl, Math, NI, O,	
	SS	WG, SA, CT
Methyl Violet 6B, chem. pure.....	Kchl	WG, SA, CT
Methyl Violet 6B, crystals.....	Kell, Klp, PK	
	.....	WG, SA, CT
Methyl Violet BSC.....	Math	WG, SA, CT
Methyl Violet extra.....	Kchl	WG, SA, CT
Methyl Violet OB, OBB, O3B, O4B,		
O5B, O6B, O3R.....	O	WG, SA, CT
Methyl Violet R, 2R.....	Kchl, Math, SW.....	
	.....	WG, SA, CT
Methyl Violet 3R, 4R.....	Kchl, Math.	WG, SA, CT
Methyl Violet 5R.....	Kchl	WG, SA, CT
Methyl Violet RO.....	Math	WG, SA, CT
Methyl Violet RSJ.....	Math	WG, SA, CT
Methyl Violet superior.....	Kchl	WG, SA, CT
Methyl Violet 72 O.....	Math	WG, SA, CT
Methyl Violet 97 S, 674, 3744, 16261,		
16261	Math	WG, SA, CT
Methyl Water Blue.....	P K	WG, SA, CT
Mikado Brown B, 3GA, MG.....	Kchl, Bs.....	CD
Mikado Gold Yellow, 2G, 4G, 6G, 8G.....	Kchl, Bs.....	CD
Mikado Orange G, R, 2R, 3R, 4R, 5R.	Kchl, Bs.....	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Mikado Yellow, 2G, 4G, 6G.....	Kchl, Bs.....	CD
Milling Blue 85.....	H S	WGS
Milling Red FFG, FR, G, R.....	Math	WGS
Milling Red 82.....	H S	WGS
Milling Yellow II, O, OO.....	Math	WGS
Milling Yellow 55.....	SS	WGS
Milling Yellow 84.....	HS	WGS
Mimosa, YC.....	Kell	CD
Moline	At	WCh
Mordant Yellow, G.....	PK	WCh
Mordant Yellow O.....	Kchl	WCh
Muscarine	Klp	CT
Naccarat	SS	WGS
Naphthalene Acid Black S.....	By	WGS
Naphthaline Pink or Scarlet, see Mag- dala Red.....		
Naphthaline Yellow.....	Bs, Math, Kchl....	WGS
Naphthamine Blue 2B, 5B, BR, 2R, 3R.K		CD
Naphthamine Blue BE, GE.....	K	CDv
Naphthamine Brown 2B, 6B, R.....	K	CD
Naphthamine Indigo Blue G, 2B, 5B, 2R	K	CD
Naphthandoine BB, BR, T, 41015, 73325	Math.	
Naphthazarine Black.....	B	WCh
Naphthazarine Blue.....	Bs	WGS
Naphthazarine Blue B.....	O	WGS
Naphthazarine Blue O.....	Bs	WGS
Naphthazarine R, S, B, BE, RE.....	O.....	
Naphthine Brown.....	SS	WCh
Naphthion Red, see Orseille Substi- tute V.....		
Naphthine S.....	SS.	
Naphtindone BB, T.....	Math	CT
Naphthoacetine Fast Black.....	Sch	WCh
Naphthocyanine	E P.	

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Name of Dye.	Agent or Maker.	Dye Method.
Naphthol S.....	Math.	
Naphtho Ruby.....	By	WGS
Naphthol Black B.....	Math	Printing
Naphthol Black BB, 3B, 4B, 6B, 12B..	Math	WGS
Naphthol Black 4BA.....	H	WGS
Naphthol Black D.....	Kchl	WGS
Naphthol Black P, NY, SG, 4R.....	Math	WGS
Naphthol Blue B, D.....	R E	WGS
Naphthol Blue 2B.....	P K	WGS
Naphthol Blue G, R.....	Math	WGS
Naphthol Blue Black A.....	Math	WGS
Naphthol Brown 193.....	H S	WGS
Naphthol Green B, OO.....	Math	WGS
Naphthol Orange	A	WGS
Naphthol Red	S B	WGS
Naphthol Red C.....	Math	WGS
Naphthol Red O.....	Kchl	WGS
Naphthol Red S.....	P K	WGS
Naphthol Yellow	Klp	WGS
Naphthol Yellow C.....	S W	WGS
Naphthol Yellow S.....	By, Kchl, Klp, Math, O, PK	WGS
Naphthol Yellow SE.....	Kchl	WGS, SS
Naphthol Yellow SL, X.....	Math	WGS
Naphtalene Yellow.....	Math.	
Naphtylamine Black 6BD.....	Math	WGS
Naphtylamine Brown.....	P K	WGS
Naphtylamine Pink.....	Klp	WGS
Naphtylamine Yellow.....	K	WGS
Naphtyl Blue.....	K	WGS
Naphtyl Blue 2B.....	P K	CD
Naphtyl Blue Black MNY, N, R, SB, S2B, S3B, 74281, FBB, FB.....	Math	WGS
Naphtyl Violet.....	K.	
Naphtylene Blue R, crystals.....	By.	

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Name of Dye.	Agent or Maker.	Dye Method.
Naphtylene Red.....	By	CD
Narceine	Klp.	
Navy Blue.....	S W	WGS
Navy Blue B.....	A C, Klp	WGS
Navy Blue DB.....	S W	WGS
Navy Blue Double conc., DR.....	O	CT
Navy Blue B, R.....	Kchl	Printing
Navy Blue V.....	Kchl	WGS, SS, CT
Neptune Green S.....	P K.	
Neptune Green 6O.....	H S	WGS
Nerol Black B, BB, 2G new.....	A	WA
Nerogene D.....	A.	
Neutral Blue.....	Math	CT
Neutral Fast Violet B.....	Math.	
Neutral Gray G.....	A.	
Neutral Red extra.....	Math.	
Neutral Scarlet.....	Kchl	CT
Neutral Violet extra.....	Math.	
Neutral Violet Fast B powder.....	Math.	
Neutral Violet O.....	Kchl	WN
New Acid Green GX, 3BX.....	By	WGS
New Acridine Orange G.....	Bs	CT
New Blue B, BF, D, 110, extra F, G, FL, L, O1114A, R, crystal, R pow- der, 72325.....	Math	CT
New Blue R.....	Bs, By, Math.	
New Coccine.....	A, Klp.	
New Coccine O.....	Kchl	WGS, SS
New Coccine R.....	A	WGS
New Cotton Solid Blue.....	Klp	CT
New Croceine.....	P K	WGS
New Direct Blue B.....	A	CD
New Ethyl Blue, B, R.....	Kchl	CT
New Fast Belgium Blue F.....	A C	WCh
New Fast Black.....	B L.	

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Name of Dye.	Agent or Maker.	Dye Method.
New Fast Blue paste, F, H.....	By.	
New Fast Blue 3R crystals.....	Kchl	CT
New Fast Gray.....	By	CT
New Fast Red.....	S W	SA
New Fuchsine.....	Klp	WGS, SS, CT
New Gray.....	By	WGS, CT
New Green.....	By	WGS, SS, CT
New Green O paste, powder.....	Kchl	Printing
New Indigo.....	Klp	CD
New Magenta.....	O	WN, WG, SA, CT
New Magenta O.....	Kchl	WN, WG, SA, CT
New Metamine Blue M.....	Kchl	CT
New Methylene Blue BB, F, GG, N, NF, R, 3R, 70721.....	Math	CT
New Methylene Gray B paste G powder	Kchl	CT
New Patent Black B, E.....	K	WGAs
New Patent Blue B, 4B, GA.....	By	WGS
New Patent Silk Blue.....	By	SS
New Phosphine G.....	Math	CT
New Red L.....	K	WGS
New Solid Green BB, 3B.....	Klp	WGS, SS, CT
New Toluylene Blue B, GG, M, R.....	O	CD
New Toluylene Brown B, BB, BBO, P.O		CD
New Victoria Black B.....	By.	
New Victoria Black Blue.....	By.	
New Victoria Blue B.....	By	WGS, CT
New Victoria Green.....	By.	
New Yellow.....	P K	WGS, CT
New Yellow L.....	K.	
Niagara Blue 6B.....	Sch	CD
Niagara Union Black.....	Sch	CWD
Nicholson Blue.....	Br, S, Klp.	
Nicholson Blue 17116.....	Math.	
Nicholson Blue B, 2B, 4B, R, 2R, 3R.	Kchl.	
Nigramine	N I.	

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Name of Dye.	Agent or Maker.	Dye Method.
Night Blue.....	Klp, PK.	
Nigrisine, J.....	SS.	
Nigrosine alcohol soluble.....	A, Bs, Kchl, Kell, Math, NI, SS.	
Nigrosine crystals, E, 73651.....	Math.	
Nigrosine water soluble.....	A, Bs, Kchl, Klp, K, Kell, Math.	
Nigrosine water soluble No. 10, No. 12.....	Kchl.	
Nigrosine Gray Blue, 1, 2, 3, 4.....	Kchl	WN, SS
Nile Blue A, 2B, NN, R.....	P K	CT
Nitraniline O.....	Math.	
Nitrazine Yellow.....	O.	
Nitrazol C.....	Math.	
Nitrophenine	ClCo	CD, WCh, SA
Nitrosamine Red.....	PK	CDv
Nitroso Base M 50%.....	Kchl	Printing
Nitroso Blue MRS.....	Kchl	Printing
Non Mordant Cotton Blue.....	Br. S.	
Nopaline	tM.	
Nyanza Black B.....	A, Kchl	CD
Nubian Black.....	H S.	
Oenanthinine	Klp	WGS, SS
Oil Yellow A, B, D.....	Math.	
Oil Black, Blue, Brown, Green, Orange, Red, Violet.....	Math.	
Old Gold SC.....	S W	CD
Old Scarlet.....	By	WGS
Oleine	B L.	
Olive Green D.....	S W	WGS
Opal Blue.....	Br. S, Kchl, Math.	
Opal blue superfine, soluble.....	Kchl	WGS, SS, CT
Opaline Black 1602.....	Beh	CD
Opaline 2G, 5G, R.....	Gb.	
Oramine Blue R.....	P K	CD
Orange	tM	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Orange A.....	Kchl, Klp, Math, S W	WGS, SS
Orange I.....	By, K, Klp, Kchl, Math	WGS, SS
Orange II.....	Kchl, Klp, Math, SS..	WGS, SS
Orange III.....	Klp, Math, SS.WGS, SS	
Orange IV.....	Bs, Kell, Kchl, Klp, PK, SS	WGS, SS
Orange C.....	S W	CD
Orange ENL, ENZ, extra, 2G.....	Math	WGS
Orange G.....	A, Kchl, Math, PK...	WGS
Orange GG.....	Bs, Math.	
Orange GG crystal.....	Math.	
Orange GRX.....	P K	WGS
Orange GS.....	O	WGS
Orange GT.....	By	WGS
Orange M.....	Klp	WGS
Orange MG paste.....	Klp	WGS
Orange MN.....	Klp	WGS
Orange N.....	K, Klp, PK.....	WGS
Orange P.....	O	WGS
Orange R.....	Kchl, Klp, Math, PK.	WGS
Orange RL, RRL, RN.....		
Orange RR.....	Math	WGS
Orange 1, 2.....	Kchl, Klp	WGS
Orange TA.....	Kchl	WGS, SS
Orange Y.....	CDC	WGS
Orange 4.....	Kchl, Math	WGS
Orange 4LL.....	Kchl	WGS, SS
Orange 64.....	Kchl	WGS, SS
Orange 71,967.....	Math	WGS, SS
Orcelline		

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Name of Dye.	Agent or Maker.	Dye Method.
Orchil Substitute G pat.....	Kchl	WGS
Oriol Yellow.....	Kell	CD
Oregon Black.....	AC	CD
Oregon Blue L, U.....	AC	WGS
Oregon Pink, Red, Yellow.....	AC	WGS
Orseille Red A.....	P K	WGS
Orseille Substitute G.....	A	WGS
Orseille Substitute N extra.....	Math	WGS
Orseille Substitute V.....	A, SS	WGS
Orseille Substitute 3VN.....	SS	WGS
Orseilline BB.....	By	WGS
Orseilline B, R.....	Kchl	WGS, SS
Orchil Crimson powder.....	P K	WGS
Oxamine Blue B.....	F, PK	CD
Oxamine Blue 4B, R.....	PK	CD
Oxamine Blue 3R, RX, 4R.....	PK	CD
Oxamine Blue Black BR.....	PK	CD
Oxamine Maroon.....	P K	CD
Oxamine Red.....	P K	CD
Oxamine Scarlet B.....	F.....	
Oxamine Violet.....	P K	CD
Oxblood 8851.....	Bs	CD
Oxy Diamine Black A, AM, AT, B, BG, BM, BZ, BZS, CBS, D, N, NF, NR. S0000, NRT, R, RR, SA, S000, W,Math FFC extra, FFG, AFF, JE, JEL. JB, JW	Math	CD
Oxy Diamine Blue 3R, G, 3G, 5G.....	Math	CD
Oxy Diamine Orange G, R.....	Math	CD
Oxy Diamine Violet B, G, R.....	Math	CD
Oxy Diamine Yellow GG.....	Math	CD
Oxyphenine Gold.....	ClCo.....	
Oxyphenine Gold G.....	H S	CD
Paeonine	Kell.....	
Palatine Black 4B.....	P K	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Palatine Chrome Black.....	P K	WGSCh
Palatine Chrome Brown.....	P K	WGSCh
Palatine Chrome Red R.....	PK	WGSCh
Palatine Chrome Violet.....	PK	WGSCh
Palatine Red.....	P K	WGS
Palatine Scarlet	P K	WGS
Paper Blue.....	Kchl.	
Paper Scarlet bluish.....	P K.	
Paper scarlet blue and yellow 3B.....	Kchl.	
Para Blue.....	NI.	
Paramine Brown C, R.....	CR.	
Paramine Indigo Blue, Navy Blue.....	CR.	
Paraphenylene Blue R, Violet.....	Bs	CT
Paris Violet.....	SS	CT
Paris Violet 6B, 7B.....	RE	CT
Parma R paste.....	S	WCh, CT
Patent Blue A, AJI, B, G conc., J1, J2, N, L, J3, J0, J00, V superfine, VG, WS	Kchl	WGS
Patent Green O, V.....	Kchl	WGS
Patent Orange.....	A	WGS
Patent Phosphine.....	Klp	CD
Patent Rock Scarlet.....	Br. S.....	CD
Pecora Black.....	Sch	CD
Pegu Brown G, DR.....	Bs	CD
Peri Blue B, G.....	Math	WGS
Persian Yellow.....	Kell	WCh
Phenamine Blue B, G, R.....	P K	WGS
Phenedine Orange J.....	SS	CD
Phenedine Pink JE.....	SS	CD
Phenedine Yellow 2A.....	SS	CD
Phenix Red A.....	Math	WGS
Phenocyanine, B, D.....	Klp	Printing
Phenocyanine PRC.....	Math	WGS
Phenocyanine TB, TV, VS.....	Klp	WCh

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Name of Dye.	Agent or Maker.	Dye Method.
Phenol Black SS.....	By.	
Phenol Blue Black 3B.....	By	WGS
Phenol Flavine.....	O.	
Phenylamine Black 4B, T.....	By	WA
Phenylene Black.....	SS	WGS
Phenylene Brown B, R.....	O	CT
Phenylene Red B.....	SS	SA
Phenylene Violet B, R.....	SS	WGS
Philadelphia Yellow G.....	A.	
Phloxine	Kchl, Kell, Klp, Math	WA
Phloxine B, BB.....	Kchl, S W	WA
Phloxine 5B, BA, BA extra, G, O.....	Kchl	WA
Phloxine P.....	P K	WA
Phloxine TA.....	Mo.	
Phloxine 749.....	Math.	
Phoenix Red A.....	Math.	
Phosphine	Br, S, Kchl, Kell, Math, NI, PK, SS..	Tannin
Phosphine 1A, 11A, extra.....	Math	Tannin
Phosphine N.....	K	Tannin
Phosphine P, LM.....	Kchl	Tannin
Phosphine G R.....	S W	CT
Pigment Brown.....	PK.	
Pink B, 2B, 3B.....	S W.	
Pina B R.....	B L	CD
Pluto Black B, G, R, A, 3B, CR, Bs.....	Bv	CD
Pluto Brown R.....	By	CD
Pluto Orange G.....	By.	
Polychromine A.....	Kell.	
Polychromine B.....	Kell	CD
Polyphenyl Black, B, G.....	Kell	WG, WGS
Ponceau B extra.....	Kchl	WGS
Ponceau B0 extra.....	A	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
Ponceau Brilliant 4R.....	Math	WGS
Ponceau G.....	Kchl, Math	WGS
Ponceau 2G.....	Kchl, PK....	WGS, SS
Ponceau 4GB.....	A	WGS, SS
Ponceau GR.....	Kchl	WGS, SS
Ponceau J, JJ.....	Math	WGS, SS
Ponceau R.....	A, Kchl, PK, SS.....	WGS, SS
Ponceau 2R, 3R.....	Kchl.	
Ponceau 2RS.....	SS	WGS, SS
Ponceau 3RB.....	A, P K	WGS, SS
Ponceau 4R.....	A, Kchl, PK...	WGS, SS
Ponceau 4RB.....	A	WGS, SS
Ponceau 5R.....	Kchl	WGS, SS
Ponceau 6R.....	Kchl, PK	WGS, SS
Ponceau 6RB, 10RB, S extra, SS extra.	A	WGS, SS
Ponceau YB.....	Kchl	WGS, SS
Prague Alizarine Yellow G, R.....	Ki	WCh
Primrose	S.	
Primrose, alcohol and water soluble.	Klp.	
Primula B, R.....	Kchl	WG, SA, CT
Primuline	BrS, By, HS, K, Kchl, Kell, Math, PK.	
Printing Black for Wool.....	PK	Printing
Printing Blue.....	A.	
Printing Blue B, H paste powder.....	R, Math.	
Prune, powder.....	Kchl	WCh
Prune pure.....	Kchl, Math	WCh
Pure Blue.....	Kchl, Klp, Math, PK.	
Pure Blue B S J.....	Klp	WGS, SS
Pure Blue O conc. double conc.....	Kchl	WGS, SS, CT
Pure Blue extra crystals.....	O	CT
Pure Blue V C.....	SS	SA
Pure Fast Yellow.....	Math.	
Pure Soluble Blue.....	Math.	

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Name of Dye.	Agent or Maker.	Dye Method.
Purple Blue O.....	Kchl	WGS, SS, CT
Purpuramine DH	D H	CD
Purpurine paste.....	BaCo, By, PK.	
Pyramine Orange, Y, 3G.....	PK	CD
Pyrogene Brown 5C, M, R, V.....	Klp	Sulphur
Pyrogene Direct Blue.....	Klp	Sulphur
Pyrogene Gray B, G, R.....	Klp	Sulphur
Pyrogene Green B.....	Klp	Sulphur
Pyrogene Olive N.....	Klp	Sulphur
Pyrogene Yellow M.....	Klp	Sulphur
Pyrol Black B conc.....	L	Sulphur
Pyrol Brown g.....	L	Sulphur
Pyronine B, G.....	By, Kchl..	WGS, SS, CT
Pyrosine B, J.....	Mo	WGS
Pyrotine Orange.....	Bs	WGS
Pyrotine RRO.....	Bs	WGS
Quinoline Yellow	A, By, PK, Kchl..	WGS
Red B.....	Math, PK.....	SW, CD
Red Blue crystals, powder.....	O	CT
Red C.....	PK.	
Red 785.....	AC	WGS
Red Violet RS, 4RS, 5R extra, 5RS....	PK	WGS, SS, CT
Red, Y, YB, YG, Y2G.....	Kchl	WGS, SS
Regina Purple, Violet.....	BrS.	
Regina Violet, alcohol, water soluble..	A	WGS, SS
Resinate Blue A.....	Math.	
Resinate Green A.....	Math.	
Resinate Red A.....	Math.	
Resinate Yellow A.....	Math.	
Resinate Violet A.....	Math.	
Resorcine Brown.....	A	WGS
Resorcine Yellow.....	A, K.....	WGS
Resorgyl Yellow.....	R F.....	CD
Rheonine	PK	CD
Rhine Blue BH.....	Jy	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Rhodamine B, B extra, 3B, G, G extra.	Klp, PK.	WA, SA
Rhodamine 3G, 5G.	Bs	WA, CT
Rhodamine 6G, 5G.	Klp, PK.	WA, SA, CT
Rhodamine extra B, O, R.	Klp	WGS, SS
Rhodamine S.	Klp, PK.	WGS, SS
Rhodinduline Red B.	By	WGS, SS
Rhodinduline Red G, S.	By	WGS, SS
Rhodinduline Violet.	By.	
Rhodinduline 2BR, Pink, RIV.	HS	WGS
Rhoduline Blue R.	By	CT
Rhoduline Heliotrope.	By	CT
Rhoduline Heliotrope 3B.	By	CT
Rocelline	Kell, Klp, Math, SS	WGS, SS, CT
Rocelline N.	Kchl	WGS, SS
Rock Scarlet YS.	BrS.	
Rosazeine O extra B, B extra, 4G.	Kchl	WA, SA, CT
Rosazine	SS	WGS
Rosafond	RH	CD
Rosazurine, B, BB, G.	By, Kchl	CD
Rose Bengale.	Kell, Math, PK, WA, SA	
Rose Bengale AT.	A, PK.	WA, SA
Rose Bengale, B, 3B conc., G.	Kchl	WA, SA
Rose Bengale N.	Math	WA, SA
Rose Bengale No. 681.	SW	WA
Roseine	BrS.	
Roseline B, G, R.	Kchl.	
Rosinduline 2B bluish, G, 2G.	K	WGS
Rosolane B, O, R, T paste.	Kchl	SA, CT
Rosolane	SS	WGS, SA
Rosophenine	ClCo	CD, WGS, SS
Rosophenine 4B, 5B, 6B.	ClCo	CD
Rosophenine R, ink.	ClCo	CD
Rosophenine Geranine.	ClCo	CD
Roxamine	BK.	

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Name of Dye.	Agent or Maker.	Dye Method.
Royal Green crystals.....	Klp.	
Royal Violet R.....	Kchl	CT
Rubidine	KB.	
Rubin, S.....	A	SA, CT
Ruby small crystals.....	KB.	
Rubramine	NI	CT
Ruffigallol	PK	WCh
Russia Red B, G.....	Kchl, Math.	CT
Russian Green.....	Kchl.	
Russian Leather Red.....	Math, O.	
Russian Red B, BB, G, GP, N.....	O.	
Sabol Brown, or palmetto extract.....	Nat.	
Safraniline	Kell.....	WGS, SS, CT
Safranine	Kchl, Kell, Klp, Math.	
Safranine AG, AGT extra.....	K	SA, CT
Safranine AN extra.....	Kchl, Math.	SA, CT
Safranine B.....	SW	SA, CT
Safranine B best.....	Kell	CT
Safranine B conc.....	Kchl	CT
Safranine BS.....	Math	SA, CT
Safranine conc.....	Kchl	SA, CT
Safranine FB extra.....	PK	SA, CT
Safranine FF extra No. 0.....	By	SA, CT
Safranine G.....	O.	
Safranine G extra.....	A, Math.	SA, CT
Safranine GGF, GGP.....	Math.	SA, CT
Safranine GGS.....	Kchl, Math.	SA, CT
Safranine M.....	O.	
Safranine MN.....	PK	SA, CT
Safranine NT	Math.	SA, CT
Safranine O.....	Kchl, Math.	SA, CT
Safranine PK	Math.	SA, CT
Safranine Purple	PK	SA, CT
Safranine RS, Resinate.....	Math.	SA, CT
Safranine superfine, bluish, yellowish.....	Kell.	SA, CT

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Name of Dye.	Agent or Maker.	Dye Method.
Safranine S 150.....	Math.....	SA, CT
Safranine T.....	Kchl, S W.....	SA, CT
Safranine Y.....	Math.....	SA, CT
Safranine 2127, 4465, 2127B.....	BrS, Klp.	
Safrosine	PK.....	SA, CT
Salicine Yellow, G, 2G.....	K	CD
Salmon Red.....	A, NI, PK.....	CD
Sambesi Black B, BR, 3B, D, F.....	A	CD
Sambesi Blue B, BX, R, RX.....	A	CD
Sambesi Brown.....	A	CD
Sambesi Gray B.....	A	CD
Sambesi Indigo Blue R.....	A	CD
Scarlet B.....	Math	
Scarlet B extra.....	Kchl	WGS, SS
Scarlet Cardinal.....	PS	
Sambesi Pure Black 4B.....	A	CD
Scarlet EC, FR, FRR, FRRR, for cot- ton	Math	
Scarlet G, GG, GL, GR11, GV.....	Kchl	WGS, SS
Scarlet BR.....	A	WGS, SS
Scarlet GRCL.....	Kchl.	
Scarlet NR, NRR.....	SS	WGS, SS
Scarlet R	By, Kchl.....	WGS, SS
Scarlet RBC.....	Math	WGS, SS
Scarlet RL.....	Kchl	WGS, SS
Scarlet 2R.....	Kchl, Klp.....	WGS, SS
Scarlet 2RCL	Kchl.	
Scarlet RRL.....	Kchl, Math...	WGS, SS
Scarlet RVL.....	Kchl	WGS, SS
Scarlet 3R, 3RL, 4R, 5R.....	Kchl	WGS, SS
Scarlet S.....	Math	WGS, SS
Scarlet 71173, 71434, 72604, 71435, 72269	Math	WGS, SS
Sea Blue	SS	WGS, CT
Seal Brown G.....	SS	CD
Serge Blue.....	O.	

Name of Dye.	Agent or Maker.	Dye Method.
Setocyanine	Kell	SS, CT
Setoglaucine	Kell	SS, CT
Setopaline	Kell	SS, CT
Silk Blue.....	Kchl	SS
Silk Blue extra greenish, J8C, IC, T, 5BNOO, T5B, T3B, TB, TR, TRL..	O	SS
Silk Gray O.....	Kchl	SA
Silk Induline B.....	Kchl	CT
Silver Gray N.....	Math	
Sky Blue.....	JB	
Smaragd Green.....	By	
Solar Black.....	AT	CD
Solid Blue.....	O	
Solid Blue BB, BD, BL, DD, RR.....	At	CD
Solid Blue BD, BRD, 2BD, 3RD, 6G...	Math	WGS
Solid Blue BL.....	At	
Solid Blue R.....	Math	WGS
Solid Blue 3R.....	Math	WGS
Solid Brown O yellowish, L, NT.....	Kchl	WGS, SS
Solid Green crystals, O, A1, 72780.....	Math.	
Solid Gray S.....	Math.	
Solid Green G.....	Klp.	
Solid Green J.....	SS.	
Solid Green JJ0, O.....	Klp	WGS, SS, CT
Solid Green O paste.....	Kchl	WCh
Solid Violet.....	Klp	WCh
Solid Yellow N.....	SS	WGS
Soluble Blue.....	Bs, BrS, Kchl, Math, SS	
Soluble Blue A1.....	O	CT
Soluble Blue B.....	Bch, S W.	
Soluble Blue 8B, 10B.....	BrS.	
Soluble Blue C1, C3.....	SW	CT
Soluble Blue, J, M, 00.....	O	CT
Soluble Blue R.....	SW	CT
Soluble Blue BV, 3B.....	O	CT

LIST OF DYESTUFFS, MAKERS AND METHODS. 351

Name of Dye.	Agent or Maker.	Dye Method.
Soluble Blue R.....	Kchl.	
Soluble Blue 3R.....	Kchl, O.....	CT
Soluble Blue SV.....	Kchl.	
Soluble Blue XG, XL.....	BrS.	
Sorbin Red.....	PK	WGS
Soudan Red I, II, III, G, R.....	A.	
Soudan Black 1, 2, 3, B, R, 2R.....	SS	WGS
Soudan Brown.....	A	CD
St. Denis Black B.....	SS	Sulphur
St. Denis Red	SS	CD
Stanley Red.....	ClCo	WGS, SS
Standard Blue, Brown, Cutch Shade, Fast Blue, Fast Brown, Red, Tan, Yellow, Red, Yellow.....	Me.	
Sterrosine Gray.....	H.	
Stilbene Orange 4R.....	ClCo	CD, SS
Stilbene Red.....	A.	
Stilbene Yellow G, 6G, 8G, 4G.....	ClCo	CD, SS
Substantive Pink CR.....	PK	CD
Sulfamine Brown A, B, D 93.....	Bs	WCh
Sulfanilin Black B, G.....	K	Sulphur
Sulfanilin Brown P.....	K	Sulphur
Sulfogen S, MO.....	L	Sulphur
Sulfon Acid Blue B, R, 3R ext.....	By	WGS
Sulphin	PK	CD
Sulpho Black	H	Sulphur
Sulpho Black G, R.....	By	WGS
Sulpho Cyanine G, 3R, 5R, GR.....	By	WGS, WCh
Sulpho Green	S	WGS
Sulphon Azurine D.....	Kchl, By	WA, CD
Sulpho Yellow S.....	K.	
Sulphur Black T, T extra, 2B extra..	A	Sulphur
Sultan Violet.....	H	CD
Sun Yellow.....	A, By, Kell, Klp, Kchl	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Superfine Violet.....	KB	
Superior Violet.....	KB	
Superior New Green Crystals.....	KB	
Swiss Black B, BG, B2G, C, DG, D...	SW	
Tabora Black R extra.....	A, Kchl	CD
Tannin Brown B.....	Math	CT
Tannin Heliotrope.....	Math	CT
Tannin Indigo	Klp.	
Tannin Orange R paste, powder.....	Math	CT
Tartrazine	Klp, PK, Kchl....	WGS
Tennyson Red.....	H.	
Terra Cotta	B L.....	WGS
Terra Cotta F, NF, NFG, X.....	Kell	CD
Terra Cotta R.....	Kell	WCh
Tetrazo Blue, 6B, 4R, RW.....	NYB	CD
Tetrazo Brilliant Blue BB.....	NYB	CD
Tetrazo Indigo Blue D.....	NYB	CD
Tetrazo Yellow CH, R.....	NYB	CD
Thiamine Yellow.....	BrS.	
Thiazine Brown G, R.....	P K.....	CD
Thiazine Red G, R.....	P K.....	CD
Thiazol Yellow.....	By, A.....	SA, CT
Thio Brown 2B, R.....	Bs	CD
Thio Carmine R paste, powder.....	Math	WGS, SS
Thio Catechine S, 1, 2, 3, 4.....	SS.	
Thio Chromogene.....	Bs, Kchl.....	CD
Thio Cyanosine.....	Mo.	
Thio Flavine S.....	Math	CD
Thio Flavine T.....	Math	CT
Thiogen Black D.....	Grie	Sulphur
Thiogene Brown R.....	Kchl	Sulphur
Thion Black BE.....	K	Sulphur
Thionine Blue G0.....	Kchl	WN, SA, CT
Thionine Blue 0, 00, 000.....	Kchl	WN, SA, CT
Thio Orange G.....	Bs	WGS

LIST OF DYESTUFFS, MAKERS AND METHODS. 353

Name of Dye.	Agent or Maker.	Dye Method.
Thio Phloxine.....	Mo.	
Thio Phosphine J.....	L P.	
Thio Ruby.....	Bs	WGS
Thio Vesuvine.....	Bs	WGS
Thio Yellow G, RM, R.....	Bs	CD
Titan Black ED.....	H	CD
Titan Blue B, BBB, S.....	H	CD
Titan Brown O, R.....	H	CD
Titan Como G, R, S.....	H	CD
Titan Gold, Gray Navy Blue, Navy R, Orange N, Pink, Red, Red 6B, Scarlet C, Scarlet CB, Scarlet D, Scarlet S, Sky Blue, Yellow H, Yellow R, Yellow Y.....	H	CD
Tobacco Brown G, R.....	Math	CT
Tolan Red I, II, B.....	K	WGS
Tolamine Green, Violet.....	Klp	CD
Toledo Blue O.....	Bs	CD
Toluidine Blue O.....	A, O, PK	CT
Toluylene Black G.....	O	CD
Toluylene Blue B, R.....	O	CD
Toluylene Brown, G, R.....	O	CD
Toluylene Dark Blue B, R.....	O	CD
Toluylene Orange R.....	Kchl	CD
Toluylene Orange G, R, RR.....	O, A	CD
Toluylene Red or Neutral Red.....	O	CD
Toluylene Yellow, SG.....	O	CD
Toraline B, a logwood preparation.		
Triamine Black B, BT, MJ.....	Klp	CD
Tramine Blue BNW, MJ, MNW, TNW.	Klp	CD
Triazol Blue BB.....	O	CD
Triazol Blue BB, 3R.....	O	CD
Triazol Corinth B.....	O	CD
Triazol Dark Blue B, 3R.....	O	CD
Triazol Indigo Blue.....	O	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Trona Red 3B, 7B, 2G.....	By	CD
Tropaeoline D, G, G1320, O, 01232, 00118, 000 No. 1, 000 No. 2, 0000, 00	Math	WGS, SS
Tropaeoline R, Y.....	Math	WGS, SS
Tumerine 914.....	Math	CD
Turquoise Blue BB, G.....	By	CT
Union Black B, BB, S, P, BG, A.....	Math	CWD
Union Blue DC, XX.....	Math	CWD
Union Blue R.....	A	CWD
Union Green.....	Sch	CWD
Union Navy Blue.....	Sch	CWD
Urania Blue, B.....	Bs	WGS, SS
Uranine	A, BrS, Math, Kchl, PK	
Ursol D, P.....	Z.	
Vacanceine Blue, Scarlet.....	H.	
Vat Red paste, powder.....	H	CD
Vesuvine B, BB, 3BM, conc., 4GB conc., extra yellow, O, RV, 2RV, 3R, su- perior	Kchl.....	WG, SS, CT
Vesuvine B.....	P K.....	WG, SS, CT
Victor Black.....	At	WGS
Victoria Black B, G, 5G.....	By	WGS
Victoria Black.....	Kchl	Wool
Victoria Blue B.....	Kchl, Kell, Klp, Math, PK	WG, SS, CT
Victoria Blue BS, alcohol soluble.....	Klp, PK..	WGS, SS, CT
Victoria Blue R, 4R.....	Kell, Klp, PK.....	WGS, SS, CT
Victoria Green 3B.....	Klp, PK..	WGS, SS, CT
Victoria Heavy Blue.....	By	WGS
Victoria Rubine G, O.....	Kchl	WGS, SS
Victoria Ruby.....	Kchl	WGS, SS
Victoria Scarlet 4BS, 8BS, G, R, 2R, Victoria Violet B paste.....	Kchl	WGS. SS
3R, 4R, 5R, 6R.....	Kchl	WCh

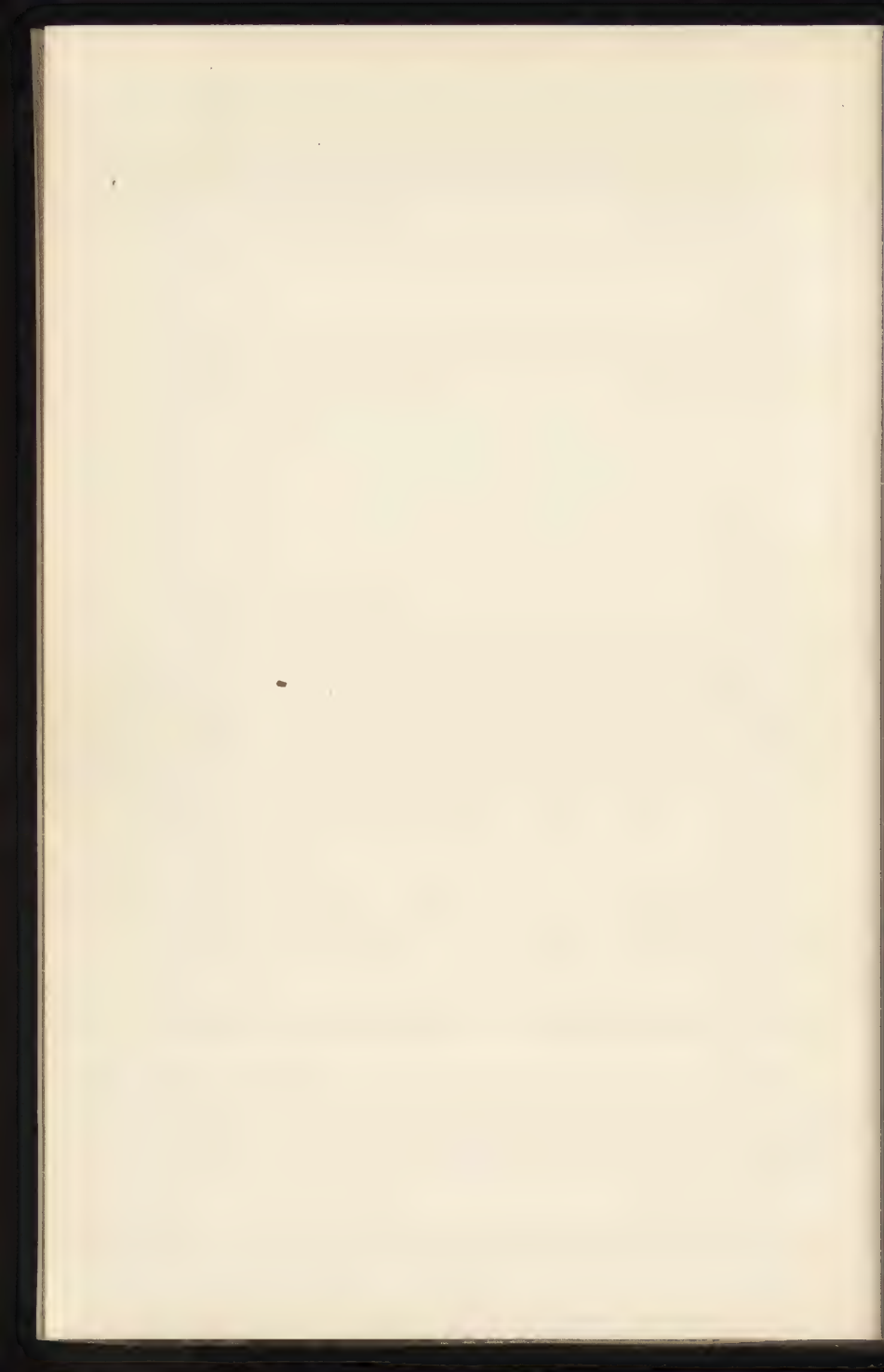
LIST OF DYESTUFFS, MAKERS AND METHODS. 355

Name of Dye.	Agent or Maker.	Dye Method.
Victoria Violet paste.....	Jy.	
Victoria Violet 4BS, 8BS.....	By, Kchl.....	WGS
Victoria Violet 8BS.....	Kchl	WGS, SS
Victoria Yellow, A, O.....	Kchl	WGS
Vidal Black S, D.....	SS	Sulphur
Vidaline Blue, BB, 5B, R, RR.....	SS	Sulphur
Vidaline Brown B, GG.....	SS	Sulphur
Vidaline Green.....	SS	Sulphur
Vigoureux Black I.....	Kchl	Printing
Vigoureux Brown I.....	Kchl	Printing
Vigoureux Gray I.....	Kchl	Printing
Vigoureux Red I.....	Kchl	Printing
Vigoureux Yellow I.....	Kchl	Printing
Violamine A, B, 3B, G, R, 2R.....	Kchl	WGS, SS
Violaniline	Math.	
Violet APF.....	SS.	
Violet 5B, 6B.....	By	CT
Violet R, RR.....	Mo.	
Violet 7B.....	KB.	
Violet 0B.....	AC	WGS
Violet Black.....	P K.	
Violet 5R.....	By.....	WGS, SS, CT
Violet Blue AP.....	SS.....	WGS, SS, CT
Violet C.....	SS.....	WGS, SS, CT
Violet 4RN	Klp.....	WGS, SS, CT
Violet 3S0N.....	SS	WGS, SS, CT
Violet non plus ultra.....	KB.	
Violet Resinate A.....	Math.	
Violet 118.....	HS	WGS
Violet 71178.....	Math.	
Vulcan Brown D, G.....	Klp	Sulphur
Walnut Brown A, B.....	Math	CT
Water Blue.....	By, Kell, Klp, Math, O, PK, Sch.	
Water Blue B.....	Math	SS, CT

Name of Dye.	Agent or Maker.	Dye Method.
Water Blue 6 B extra.....	A, Bs.....	SS, CT
Water Blue BS, R, RB.....	Math	SS, CT
Water Blue 00.....	K	SS, CT
Water Rose B.....	Klp	WGS, SA
Water Soluble Eosine.....	Klp	WGS, SS
Wine B.....	S W.....	CD
Wool Black.....	A, PK.....	WGS
Wool Black B.....	A, Bs.....	WGS
Wool Black 4B.....	A, A C.....	WGS
Wool Black 4BF.....	A	WGS
Wool Black 6B.....	A, Bs.....	WGS
Wool Black GR.....	A	WGS
Wool Black WC.....	At	WGS
Wool Blue K.....	PK	WGS
Wool Blue AF.....	Fl	WGS
Wool Blue B, 2B, R, 5B.....	A	WGS
Wool Blue N, R extra 5R.....	By	WGS
Wool Blue S.....	P K.....	WGS
Wool Blue SS.....	Kell	WGS
Wool Gray.....	Bs	WGS
Wool Gray, B, B double G, R.....	Klp	WGS
Wool Green B, BS.....	By, Klp.....	WGS
Wool Green S.....	Klp, PK.....	WGS
Wool Green SS.....	Kell	WGS
Wool Induline B.....	K.....	
Wool Jet Black 2B, 3B.....	A	WGS
Wool Red B.....	Math	WGS
Wool Red extra.....	K	WGS, SS
Wool Scarlet R, 4R, 37W.....	Sch	WGS
Wood Violet S.....	PK	WGS
Wool Yellow.....	P K.....	WGS
Xanthine	Kchl, Klp.....	SS
X L Blue, Red.....	H.....	
Xylidine Orange 5572.....	Math.....	
Xylidine Ponceau, see Ponceau 2R.		

LIST OF DYESTUFFS, MAKERS AND METHODS. 357

Name of Dye.	Agent or Maker.	Dye Method.
Xylidine Red, see Ponceau, 2R.		
Yellow Coralline.		
Yellow Fast to Soap.....	SS.	
Yellow for Leather, O, 2a, 7, 11, G.....	Kchl	Tannin
Yellow Resinate A.....	Math.	
Yellow SE.		
Yellow T.....	Klp	WGS, SS
Yellow W.....	By	WGS, SS
Yellow W R.....	Klp	CD
Yellow 5183, 521.....	HS	WGS
Yellow II.....	Math.	
Yellow N.....	R H.	
Zambesi Black D.....	A	CD
Zinaline.		
Zambesi Blue X.....	A	WGS
Zulu Black B.....	HS	CD
Zurich Black B, BC.....	S W	WGS
Zurich Blue B, G, GG, R, 2RC.....	SW	WGS
Zurich Brown DY.....	S W	WGS
Zurich Green 6BY.....	SW	WGS
Zurich Orange R, Y.....	S W	WGS
Zurich Red BC.....	S W	WGS
Zurich Scarlet 2RC, 5RC.....	S W	WGS



PART VII.
MISCELLANEOUS NOTES.



MISCELLANEOUS NOTES.

A NOVELTY IN COTTON DYEING.

John W. Fries, a practical cotton and woolen manufacturer of Winston-Salem, N. C., has spent several years in working out processes and machines which constitute a veritable revolution in the art and practice of dyeing. Patents have been taken out in this and foreign countries, and we are informed that others have been applied for.

As a manufacturer of coarse goods, the selling price of which is notoriously near to the raw material, Mr. Fries was long impressed with the excessive labor cost involved in the repeated handling of yarns and cloth by old methods, and set himself to devise methods and machines, by which the material, taken dry as it would ordinarily go to the dye-house, might be dyed, and if desired sized and finished, and delivered again without manipulation, and absolutely in one operation.

For the basic dyes as contemplated in his earlier patents he uses acetate of lime or its equivalent with the color held in solution by free acid, which free acetic acid is driven off on drying, and leaves a precipitate of the color with basic acetate of lime, on the fiber; and provides for further fixing this precipitate if desired, by the use of common soap, which forms an insoluble lime soap. This method is well adapted to light and medium shades.

In his later work, Mr. Fries sticks to the "one operation" idea, but otherwise follows an entirely different line, using the direct or substantive dyes, which are developed and fixed

in an atmosphere of dry steam. By this method all shades are produced, from a mere tint of any color up to a full black.

These machines can be advantageously used also with the new sulphur dyes, which are attracting so much attention in the technical world, and we predict that these sulphur colors are "the dyes of the future," when they shall come to be generally used in this way.

As yet Mr. Fries' machines have been sold only for cotton chain dyeing, but his patents contemplate their use on all kinds and forms of textile materials, and a machine for coloring cloth is now in process of construction.

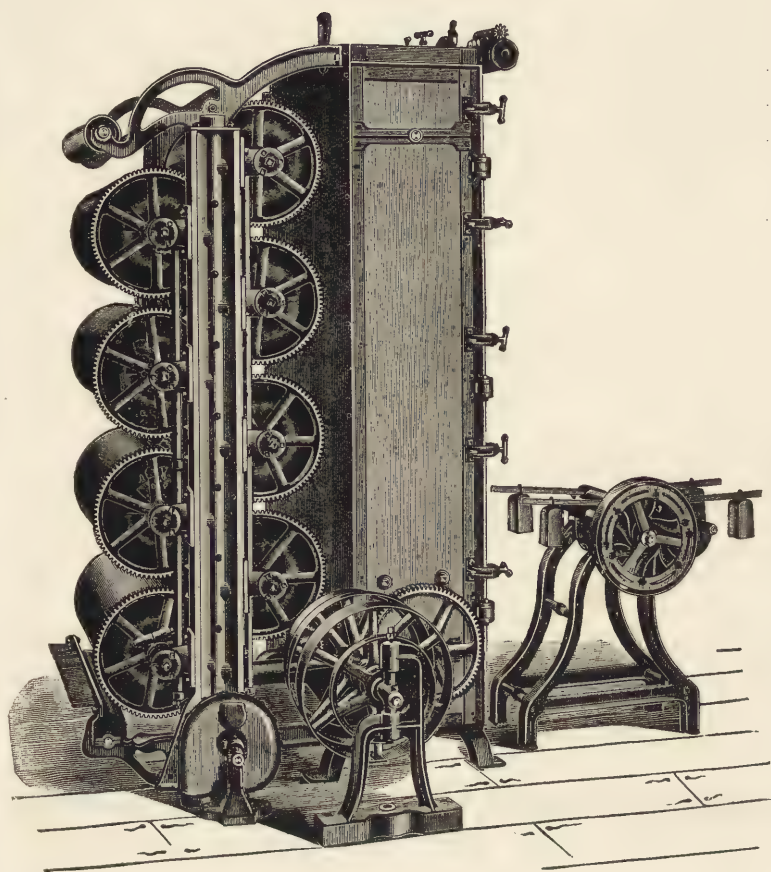
INDIGO.

Dr. M. Liebert.

After the constitution of indigo had been established, the chemists—who by that time had learned to build up by synthesis, from their component parts, complicated chemical bodies which were primarily known as vegetable matter—naturally began to feel their way to building up this indigo blue synthetically.

With these researches the name of Adolf von Baeyer, of Munich, will be coupled for all time as the great pioneer of the synthesis of indigo. He succeeded, in 1878, by a series of more or less complicated reactions, in converting oxidol into isatin. Isatin, on the other hand, was easily converted into isatin-chloride, and this, when reduced, yielded indigo.

However, a more beautiful synthesis than the one just explained was discovered by Baeyer two years later. He used cinnamic acid as his starting material, and converting this first into its nitro-compound, and, by subsequently brominating the latter, produced first the di-bromide of this acid, then ortho-nitro-propionic acid, and, finally, isatin and indigo blue.





You will wonder how it was possible that a synthesis, which requires as a starting substance cinnamic acid can be looked upon at all within the range of commercial manufacture. Indeed, if this synthesis had relied upon the cinnamic acid, which was extracted from the bark of cinnamon, and, as such, dearer than commercial indigo, this product would have had no interest whatsoever from a commercial point of view. But cinnamic acid had then already become a commercial product, which was easily manufactured from coal tar distillates by the simple process known as "Perkin's Reaction":—Benzaldehyde boiled with sodium acetate and acetic acid anhydride, produced cinnamic acid.

The use of cinnamic acid as the raw material for manufacturing indigo, presented therefore no special difficulty. It was the conversion of this acid into that nitro-compound, which alone could be used for the synthetical building-up process, that was beset with difficulties, because cinnamic acid, when nitrated, did not only form one, but two nitro-compounds, the ortho and the para nitro cinnamic acid.

Of these, the para compound, of which there was the greater yield, proved to be of no value for the further synthesis. Although it became possible by constant study to vary the process, so that the yield of the ortho-compound reached 60-70 per cent., the difficulties of manufacturing indigo by the cinnamic acid process on a technical scale was so great, that the commercial aspect remained unsatisfactory.

In 1882, a further synthesis was discovered; in this case, ortho-nitro-benzaldehyde was the raw material, which when brought into reaction with acetic acid, acetaldehyde, pyruvic acid, and alkali, produced indigo. Here, again, the difficulties lay in the scanty formation (from the initial benzaldehyde) of the ortho-nitro product by the ordinary process of nitration, and this ortho-compound alone was of value for the indigo synthesis. I may say that the Farbwerke-Höchst, after endless study and research carried on over many years with undiminished zeal, and at a tremendous sacrifice of money, at last succeeded in perfecting this process to that degree that the ques-

tion of manufacturing indigo by the nitro-benzaldehyde process on a commercial scale could be entered upon.

In the meantime, in 1890, another most brilliant discovery had been made by Prof. Heumann, of Zurich. He had obtained indigo by melting phenyl-glycocoll with caustic alkalies.

This process was very simple, the principal raw material phenyl-glycocoll, was easily obtainable, and therefore great hope was entertained of being able to compete, by this apparently simple procedure, with the natural indigo. However, it often happens that what looks an easy and smooth method in the preparatory stages, proves to be a most difficult problem when carried out under technical conditions. This was the case with this indigo synthesis. Although, as I have said before, and as I am going to show presently, the raw materials, necessary for this process, was, comparatively speaking, very cheap, the yields remained too small to make Heumann's first process a commercial success.

But Heumann had found that, not only phenyl-glycocoll, but also carboxylic acid of the latter produced indigo when melted with alkalies.

Phenyl-glycocoll is obtained by bringing into reaction monochlor-acetic acid and aniline—its ortho-carboxylic acid. on the other hand, by letting monochlor-acetic acid react upon anthranilic acid.

Although the anthranilic acid was naturally not as easily obtainable as the aniline used in the first process, the yield of indigo was so much increased, and the reactions took place so much more smoothly with phenyl-glycocoll-carboxylic acid, that this second process alone was likely to lead to victory. And, indeed, victory was the reward. Chemical research had naturally at first to be directed upon the manufacture of anthranilic acid. After years of no less determined than enthusiastic investigation, a method of manufacturing this acid from ordinary naphthalene, was at last perfected. After this accomplishment the manufacture of indigo on a commercial scale could be begun.

Indigo blue manufactured artificially from coal-tar products is identical in every respect with the natural indigo, and by no means to be considered a surrogate of the latter; and since it is constituted as is the very purest form of the natural product (which is obtained only as a laboratory preparation), it shows, of necessity, the same properties and reactions. Only, as regards its physical appearance, there might be a difference. For, though the artificial indigo may show, in powder form, slight variations, which have their cause in the finer or coarser state of division, it will always remain a homogenous product throughout; while the appearances of the natural indigo is affected by impurities. These, as you know, vary, not only in the different crops, or different kinds of indigo, but even in individual chests.

The indigo blue, whether of so-called natural, vegetable or artificial (coal-tar) origin, can only be used as a dyestuff after converting it into the soluble indigo white. The conversion into this soluble state is brought about by certain reducing agents, or by fermentation in the presence of alkalies. The success of indigo dyeing, therefore, depends upon the proper preparation of the vat.

The method which still holds the foremost place of all indigo wool-dyeing processes is that of the fermentation vat. This method is many hundreds years old, and, although in course of time it has naturally been improved upon in many details, it has remained unaltered in principle. It is based upon the observation that vegetable matter, when undergoing a process of fermentation, in a liquid containing insoluble indigo blue, changes this indigo blue to indigo white.

We know that fermentation has its origin in the decomposition of vegetable matter. This decomposition is brought about by microbes, which thrive and multiply most rapidly under conditions favorable to their existence.

They take up oxygen from their surroundings, and, on the other hand, their decomposition products act upon and reduce indigo blue to indigo white. In order to keep this indigo white in solution directly on its formation, the liquid requires to be alkaline, and either lime or soda are added to the vat

for this purpose. If the fermentation is very active, more decomposition products are formed than in a slowly working vat, and the alkali which is added to the vat will, in that case, be partly used up for neutralizing these decomposition products which contain a number of organic acids (lactic, carbonic, etc., acids), besides hydrogen, which is the principal factor in the reduction. From this it is evident that one of the most important features in working a fermentation vat is the proper regulation of the fermentation. In the other methods of setting an indigo dye vat, the process of fermentation is replaced by direct chemical action.

There are two different methods used in practice for setting fermentation vats: the woad and the soda vat.

It is scarcely possible to give definite recipes for the setting and controlling of these vats. Practice will serve as the only reliable guide.

The soda vat is principally used for very bright shades of blue. A vat containing about 700 gallons is set with:—

- 6 pounds Madder,
- 6 pounds Molasses,
- 15 pounds Bran,
- 15-30 pounds Soda,
- 10-15 pounds Indigo, 20%,
- 2 pounds Slaked Lime.

These ingredients are added to the vat liquid one by one, and the latter, after being well stirred, is heated up to 120° F. The vat is then covered up, and allowed to rest for a day; then again carefully stirred up, and again left to rest, and this process repeated until the fermentation (which often sets in as early as the second day) is far enough advanced, and the indigo blue reduced to indigo white. This will be apparent by the liquid having changed its color from dull black to yellow. The vat has "come on" and is now ready for the dyeing operation.

The woad vat, which is generally used for dark blues, is distinguished from the soda vat, firstly, by its containing considerably less soda; secondly, by the addition of woad, and thirdly, by its higher temperature. For while the soda vat ought never to rise above 120°-125°, the woad vat may be heated to 160°-165°.

In respect to setting and controlling this vat, the same mode of working is followed as for the soda vat:—

60 pounds Woad,
10 pounds Madder,
20 pounds Soda,
12 pounds Molasses,
25-30 pounds Indigo, 20%,
3 pounds Lime.

represent the initial setting of a woad vat of about 700 gallons.

Before the dyeing operations begin, however, it is necessary, both in the soda and the woad vat, to sharpen the dye-liquid with lime. This addition of lime acts as a check upon the fermentation, and regulates it; it also supplies the vat with the alkali which is required to bring about, and keep in solution, the indigo white produced by the fermentation. If added in too large a quantity at a time, the lime may eventually stop the fermentation altogether, and, on the other hand, if too little lime is used, the fermentation might become so active that the acids which are generated during the fermentation are only partly neutralized. In that case, part of the indigo becomes insoluble, and is lost as a coloring matter.

The woad dyer's attention must, therefore, be directed upon the proper sharpening of his vat before he can successfully begin the dyeing operation.

In cotton dyeing, the chemical vats, as they are called, vary considerably in different dye-houses; sulphate of iron, zinc-lime, bisulphite-zinc-soda vats, are used. In wool dyeing, however, the so-called hydrosulphite process alone is of practical value. Only this can compete with the old fermentation vat.

Two different methods of preparing a hydrosulphite vat are used in practice: the bisulphite-zinc-lime vat and the hydrosulphite soda vat. The former, which is chiefly used in Great Britain, contains a considerable amount of sediment, consisting of lime-zinc dust, etc., and the hydrosulphite vat, on the other hand, is practically free from sediment. In both cases a standard indigo solution is made separately, and added to the vat liquid in different proportions according to requirements. The hydrosulphite vat is prepared in the following manner:—

8 gallons Bisulphite (72° Tw.).

are poured into an ordinary paraffin cask, three parts full of luke-warm water. To this solution, 12 lbs. zinc dust are quickly added, and the whole stirred well for half an hour. An hour later, 8 lbs. caustic soda (100%), previously dissolved in a little water, are added and the mixture is again well stirred. After allowing the zinc to settle down to the bottom, within one hour, the clear hydrosulphite solution is ready for immediate use.

In another cask:—

40 pounds Indigo, 20%,

4 pounds Caustic Soda, 100%,

are diluted with 2-4 gallons of water, and heated to 115°-125° F. To this the newly prepared hydrosulphite solution is added until the cask is full. The whole is then stirred up and again heated to 115°-125° F. This, then, is the standard indigo solution for the hydrosulphite soda vat.

The standard solution for bisulphite zinc-lime vat is prepared in a similar manner, lime being used instead of caustic alkali:—

40 pounds Indigo,

4 gallons Milk of Lime, 20%,

are mixed with two gallons of water, and into this mixture are stirred:—

5 gallons Bisulphite (56° Tw.).

previously "killed" with 7 lbs. of zinc dust.

The whole is filled up with hot water (150°-160°) to about 30 gallons, and well stirred. In about two hours, the indigo will be reduced, and the standard solution, which ought to be yellow, can then be added to the dye-vat.

The vat is generally prepared the night before, by adding to about 700 gallons of water, 1½ gallons bi-sulfite, and 1½ lbs. zinc dust.

On account of this sediment it is evident that these vats have to be built very deep, so as to allow the sediment to settle down, and the goods to keep clear of it in the dye-liquid.

In spite of all the advantages which these hydrosulphite vats undoubtedly offer, their introduction was retarded on account of certain drawbacks, which were difficult to overcome.

Loose material, dyed in the bisulphite-zinc-lime vat, often shows white tips, which are very disagreeable to the manufacturer and in piece-dyeing, the penetration is frequently at fault. On the other hand, the hydrosulphite-soda vat does not always work satisfactorily, owing to the great amount of caustic alkali. This is looked upon with dismay in wool-dyeing, since caustic soda, even at the ordinary temperature, injures the wool, and makes the fiber tender. In order to overcome these difficulties a great number of experiments

the depth of blue required. In a well-conditioned vat, the liquid must have a greenish yellow appearance, and a dyed pattern must turn green evenly and smoothly when exposed to the air. A pure yellow is a sign of too much alkali, or hydrosulphite, while a pure green signifies too little of it.

After the vat is prepared it is stirred a few times, and the well-wetted wool (about 60 lbs.) entered. Two men must move the wool slowly about under the surface of the liquid for 15-20 minutes. Then the wool is taken out and at once well squeezed. For this purpose it is best to use a wringing apparatus, which allows the squeezed out liquid to run back into the vat; the loose wool must be allowed to turn green (oxidize) in the air, then it is put into the vat again without any more indigo being added, and is treated in just the same manner as before. The wool absorbs much more indigo in the second dip, so that most shades may be obtained in two dips.

were made, which aimed at reducing the employment of the dangerous caustic alkali to a minimum, and at finding a method of indigo dyeing, which combined simple application and certainty of working with perfect preservation of the fiber.

The Farbwerke Hoechst have succeeded in bring out a preparation by means of which an almost perfect vat is easily set and worked. Indigo Vat Liquid I, as this preparation is called, contains no free caustic alkali, nor is any lime required for the working of it.

A vat of about 300 gallons (a wooden cistern by preference) is filled with warm water, heated to 120°-130° F., and 1-2 pints ammonia added, until, on testing, a slight alkali reaction is noticeable. Then the following ingredients are added, one by one:—

- 1 gallon Glue solution,
- 1½ gallons Hydrosulphite, 20%,
- 1-2 gallons Indigo Vat Liquid I.

The quantity of indigo vat liquid is, of course, regulated by

If a very dark blue is required, some bisulphite, diluted with water, must be gradually sprinkled over the wool in handling it in the vat. This has the effect of producing in the vat, which was alkaline at first, a slightly acid reaction. The latter may easily be recognized by the absence of any red tinge in a tumblerful of the vat liquid, to which have been added a few drops of a phenolphthaleine solution; furthermore, it may be tested with litmus.

One can tell by practical experience, by the gradual lightening of the vat liquid, just how much bisulphite is necessary in order to drive about four-fifths of the indigo in the vat onto the wool. As a rule 1-2 pints are sufficient.

Before the vat is used again for fresh lots, it must be neutralized by the addition of ammonia until a slight alkali reaction takes place. In order to recognize this condition the phenolphthaleine solution is again used. This should now produce a faint pink tint in a sample of the liquid, which, however, soon disappears. If it does not disappear, then the vat is too alkaline; as a rule, 1-2 pints of ammonia are enough. After neutralizing, the same amount of hydro-sulphite and the required amount of indigo vat liquid are added again. If a very dark shade is to be dyed, and much fresh indigo vat liquid is required, then it is not absolutely necessary to neutralize the liquid beforehand, as the ammonia contained in the indigo vat liquid is usually sufficient for the purpose.

Yarns are dyed exactly like loose wool; they are hung on frames, or, better still, on V-shaped iron rods, and moved about under the liquid. Light and medium shades are dyed (like loose wool) in a slightly alkaline vat; for dark blues, bisulphite is added for the second dip, just before the material is entered. Whenever a darker shade is required, it is advisable to give two dips on account of the better equalization.

In order to dye piece-goods in a rational manner with indigo vat liquids, a "hawking machine" and a "wringer" are necessary. Before dyeing the goods must be well moistened,

preferably on a "washer" and then hydro-extracted, so that they are wet all over evenly. After this preparation, they are entered into the vat and worked from 15 to 20 minutes. The length of time given to the dip must be regulated by the number of pieces to be colored and also by the depth of shade required. Then the goods are taken out, well squeezed, and either oxidized in the air (in which case they must be quickly plated down) or by cold water.

As is the case in dyeing wool and yarns, two dips are usually given, and for very dark shades, bisulphite is added to the vat before the second dip, until it shows a slight acid reaction.

The advantages of this new vat are apparent, when a comparison is made with the old hydrosulphite or fermentation vats. The absence of lime alone in the new vat will prove of the greatest importance to the preservation of quality and the handle and appearance of the dyed goods.

The ammonia contained in the vat liquid makes the wool purer and cleaner, and after dyeing, it is more open than before.

Lastly, the productive capability of this vat is decidedly greater than that of a much larger fermentation vat; it can be used uninterruptedly from morning until night, and, with a little care and attention, produces uniform shades of equal depth, and fast to rubbing. The objection to the hydrosulphite vat (that it makes the wool tender by the great amount of alkali) does not hold good as regards the new vat. This is only made slightly alkaline with ammonia at first, and in the course of dyeing, made to react neutral, or slightly acid. After dyeing, the wool is cleaner, and more open and voluminous than before. Light tips, the chief fault of the hydrosulphite vat, are absolutely avoided, and even badly scoured wool can be evenly dyed in the new vat.

THE USE OF STANDING KETTLES IN DIRECT COTTON
DYEING.

In dyeing standard shades, upon cotton yarns, etc., the most economical method to adopt is that of standing kettles, for the reason that there always remain in a dyebath, after a batch of stock has been dyed, a variable quantity of color that is still available, provided it is augmented by the addition of a further quantity of fresh color, to bring it up to the original amount.

For light shades, or such as do not exceed 1 per cent. of color, there appears to be but little inducement to work on the standing-kettle basis, but all dyeings made with larger quantities will show considerable economy by adopting such methods.

In the first place, certain conditions have a marked influence upon the value of standing kettles, and these conditions must not be materially changed from the commencement of the dyeing of the particular shade to the completion, even if it should extend throughout a season. These conditions are based upon two important factors, namely, the volume of the bath, quantity of dye-stuff used to start with and the amount of salt used. (In this article any reference to salt invariably signifies common salt, unless otherwise indicated.) As a general rule, the American yarn kettle contains about 300 gallons of water, or 25 times as much water as there is weight of material to be dyed, and it is quite incomprehensible how ambiguous some of the published dyeing formulae are, emanating from European dye works, formulae which never originated in a practical dyehouse, or else their sponsors were not practical men. To work 100 pounds of cotton yarn with less than 300 gallons of water is not good practice, as with less volume of liquor thorough penetration is not always assured, and, besides, uneven results will most surely result.

The quantity of salt to be used for ordinary full shades

should be between 25 and 40 per cent. of the weight of the cotton. The heaviest shades and all direct blacks should have the latter quantity to start with, and for each succeeding batch of 100 pounds of cotton there can be added with perfect safety from 10 to 15 pounds to keep up the bath.

The quantity of dyestuff always depends upon the depth of shade required, and the first batch of yarn dyed is nearly always the result of experiment on the part of the dyer, who has gradually brought it up to shade by cautious additions of color, and, carefully watching conditions, the facts thus secured are immediately put into execution when the second and succeeding lots are being dyed.

After prolonged experimenting, both on a large scale and in the laboratory, it has been ascertained that the absorption of color from the dyebath is quite close to two-thirds of the original quantity, when dyed under normal conditions, thereby leaving as unabsorbed dyestuff one-third, which must be brought up to the original quantity to produce the proper shade. Of course, all direct-dyeing colors do not exhaust from the dyebath in the same manner; thus, a number of the browns, and the benzopurpurines and Congo reds. exhaust almost completely, even for heavy shades, while a number of other colors, chiefly the blacks, blues and greens, do not exhaust even up to the two-thirds limit. Hence the dyer should modify the conditions so that the results will be equalized, either by increasing the density of the bath by adding salt, giving a higher percentage of dyestuff, working for a longer time at a boiling temperature, or allowing to cool down in the bath.

These expedients are all made use of, but the best and most economical practice is to use the maximum quantity of dyestuff to produce a given depth of shade in the shortest time, as the shorter the time the greater number of batches can be dyed in a day. To allow the dyebath to cool down before removing the dyed yarn is correct in principle, but when we contemplate a volume of nearly 300 gallons at or nearly the boiling temperature cooling down to, say, 165° F., it will be at once seen that this procedure is out of the question.

One of the greatest drawbacks to the use of the standing kettle in cotton dyeing is found when a dyestuff is used which is a mixture. Such compounds of two or more dyestuffs are not always made with due regard to the possibility of being employed for continuous dyeing, the dyes used being of different properties, that is, one is taken up much more freely than the other, so that by the time the third or fourth batch of dyed material is lifted the shade begins to show a decided change.

Standing kettles for blacks are more easily maintained than for any other color, on account of the regular rate of absorption from the bath, and the general uniformity of the dyestuff. As a rule, the dyed yarn is simply lifted out, allowed to drain for a few minutes, and washed, during which time the kettle is made up freshly with more dyestuff and salt, and a new lot of material under way. In most cases, when a very full black is required, the extra boiling is indulged in, to compensate for the absence of a specially concentrated bath.

Since the sulfur colors have gained such a strong foothold, particularly the blacks, closer attention is being given to standing or running kettles. This is due to the fact that, pound for pound, the sulfur blacks are weaker tinctorially than the ordinary line of cotton blacks, and that it is necessary to maintain standing kettles, started in the first place with as high as 30 per cent. of dyestuff. It was this apparently large amount of dyestuff that had a deterring influence on many dyers in the early days from using these colors, but since their properties have become so thoroughly understood they have, in a large number of instances, entirely displaced the salt colors. The use of a standing kettle for the proper dyeing of sulfur colors is of prime importance, for, for some unexplained reason, the result of a first-kettle dyeing is never equal to that obtained from the subsequent ones; in other words, the older kettles become ripier.

The question is frequently asked, "How long can a continuous kettle be run?" This is difficult to answer for several

reasons. In the first place, it is recognized by all experienced dyers that, no matter how clean the stock is that they handle, there is always a certain small amount of mechanically adhering dirt that will surely find its way to the dye vat, and as successive lots are dyed, constant additions are made of this soluble dirt; so that a point will be sooner or later reached when the amount of dirt from the yarn, etc., will have a serious influence on the shades dyed. Again, leaving out of the count the yarn dirt there is always a certain amount of insoluble matter introduced to the dyebath by means of the salt used, and although this may be relatively small, yet it has also a serious tendency. By far the most source of trouble, and one which seriously shortens the life of a standing dyebath for direct colors, is the residual color left in the dyebath, after the actual dyeing. This must not be confounded with certain dyestuffs that do not exhaust from the baths at the same rate, but are rather colored bodies formed at the time the base color is manufactured, but which are not, strictly speaking, dyestuffs. These residuals gradually accumulate to such an amount that they make their presence felt, and then it is necessary to run off the tub and start afresh, the trouble being not so much an alteration in shade, but the tendency is to cause the dyeing to come up uneven.

Standing kettles for browns and greens cause more trouble in old baths than other colors, the reason being that most browns are compounds of a yellow, red and blue, although many heavy browns are prepared by using a brown as a base, and building around it with a blue, black or a green and red. Many heavy greens are compounds of a type green with varying additions of blues, yellows or blacks. Thus it is easily seen just why standing kettles of such dyestuffs require "touching-up" with other colors in addition to the original dyestuff.

The steady use, in regular amounts, of soluble oil in the cotton dyebath is not quite good practice in standing kettles, because in a short time a point will be reached where the salt of the dyebath will "break" the oil, and cause the fat or

oil to rise to the surface of the bath and adhere firmly to the yarn being dyed, the result of which will be shown in streaks and uneven blotches. It is better to wet out the yarn beforehand, so as to keep the dyebath as clean as possible.

Previous reference has been made to the addition of salt to the dyebath in order to restore the "density" of the dyebath. This is of much importance, for unless the right proportions of water, salt and dyestuffs are maintained from one batch to another, concordant results cannot be expected. In order to have this regular, the loss of water due to evaporation must be replaced, and also the amount of salt taken out mechanically by the yarn must be replaced. It is quite erroneous to assume that the salt added to the dyebath suffers some kind of a chemical change during the dyeing. As a matter of fact, the added salt remains, chemically, as salt, even after a prolonged series of dyeings. There can be no chemical disruption of salt in the presence of substances weaker in affinity than its component parts. As a rule, 100 pounds of cotton will take up from the dyebath about 50 pounds of water, and on the basis of 40 pounds of salt to 300 gallons of water, the dyer will have to add about 1 pound of salt for each additional 100 pounds of cotton to be dyed; but as this seems to be a small quantity, it is the custom to add about 10 pounds. It is well to remember that water will not hold in solution more than 25 per cent. of salt, so that by the time the sixtieth dyeing was made, the bath would be ready to crystallize; but, as a matter of fact, by the time the twelfth dyeing is reached, the dyestuff would begin to salt out, and no dyeing could take place.—*Textile Record*.

FORMALDEHYDE—THE DETERMINATION OF.

In the former method of determining formaldehyde by means of potassium permanganate in alkaline solution, the end-point was difficult to recognize. The estimation is easily performed in a strong sulfuric acid solution when the aldehyde is oxidized to carbon dioxide and water. The process is as follows:

35 c. c. of 1-5 normal permanganate is mixed in a stoppered flask of 250 c. c. capacity, with a cooled mixture of 30 grams sulfuric acid and 50 grams of water, and 5 c. c. of formaldehyde solution (10 c. c. diluted to 400 c. c.) are slowly dropped in with constant shaking. After standing 10 minutes with occasional shaking the excess of permanganate is titrated with 1/10 normal hydrogen peroxide. This method gave 37.3 per cent. of formaldehyde as a mean of three analyses, compared with 37.08 per cent. by Romign's method, which is: 30 c. c. of normal caustic soda is mixed in a stoppered half liter flask with 10 c. c. of dilute formaldehyde solution (12.5 c. c. in 500 c. c.) 45 c. c. of 1/5 normal iodine are slowly added from a burette until the liquid is deep yellow. After well shaking for one minute, 40 c. c. of normal hydrochloric acid are added, and the excess of iodine titrated with thiosulfate after standing—L. Vanino and E. Seitter.

TEASELS.

The teasel burr is still used for napping cloth. It has been supplanted to a great extent in this country at least, by the wire napper, but some finishers still use the teasel gig, particularly for face finished goods such as beavers and kerseys.

Teasels are still used for napping cloth to a large extent abroad, and the market of the American teasel grower to-day is found largely in foreign countries.

PRESERVING DYE VATS.

Wooden dye vats and liquor cisterns, when used, sooner or later become saturated with the various liquors and chemicals, some of which will tend to rot the wood in time. Besides, such saturated vats are somewhat difficult to keep clean. In order to preserve wooden dye vats or tanks they might be covered over with a composition made by dissolving $2\frac{1}{2}$ pounds shellac, $4\frac{1}{2}$ ounces rosin, and 4 ounces Venice turpentine in 1 gallon of methylated spirit. The ingredients are mixed together in a bottle or other convenient vessel and then shaken at intervals until they are thoroughly incorporated. This is applied by a brush, but care should be taken that the wood is quite dry. This composition will not affect, nor be changed by, any dye chemicals or dye liquors with the exception of caustic lyes.

It is foolish economy for a dye house to be restricted in its equipments; the work is never so well done, nor is it so quickly done. Let us take as an example indigo vat dyeing. In order to produce certain shades it is necessary to dip the cotton two or three times. In all the best dyehouses these dippings are done in separate vats, and the result is an excellent color. But for the sake of saving room and the time and trouble of setting several vats, some dyers will only have one vat, and the consequence is that the work turned out is not up to the mark. It is dull, and rubs badly, while the vat itself gets deficient in dyeing power very quickly, and becomes charged with deposited indigo. There is really in the end no saving, and there is no satisfaction to the dyer in turning out his work.—*Dyer and Calico Printer.*

RUSSIAN COTTON.

The United States Consul at Moscow, states that 233,556,779 pounds of cotton were shipped into European Russia, via Krasnovodak, during the year ending April 1, 1901. He adds that the production of cotton in Central Asia is increasing every year. The government and the cotton consumers are assisting the planters to improve the cultivation, so as to compete with American cotton in European Russia. The planters have now almost learned to prepare the cotton by the American system, and receive very high prices. The seeds are imported from the United States.

The Russian consumers prefer to buy the Central Asia cotton, as it is packed in small bales, the same as Egyptian, since in the transportation of the large bales there is a loss of from 8 to 10 per cent. in weight. This is a very important question for American producers.

THE FORMATION OF MILDEW IN WOOLEN GOODS.

The formation of mildew in woollen, as in cotton goods, is due to the development of fungid growths in the presence of air and moisture at a certain temperature. The most favorable time for the appearance of these fungi is in the summer and especially in the month of August they occur very frequently. Certain dyes, like vat blue, are particularly liable to this growth, probably on account of the alkaline re-action of the dye liquors. The danger can only be avoided by not allowing the goods to lie in a heap for any considerable length of time. One of the primary causes of mildew can frequently be observed in the process of weaving moist cloth. Two different kinds of fungi may appear at this stage, according to whether the fabrics remain cold or hot. In the first place the fiber is not attacked or disintegrated, and also the fun-

goid growth often extends over a considerable area. Dark shades are hardly ever affected. The mildew can easily be brushed off.

More serious is the second kind, which appears in the form of smaller or larger patches, generally disintegrating the fiber. Mildew stains of this kind show after the milling as bare patches, and the fiber appears quite rotten. The same stains are often caused through the cloth, after the milling process, being left to lie unwashed. Undoubtedly the highly-alkaline reaction of the cloth at this stage is very favorable to the growth of the fungus.

Other stains occur in woolen cloth, which in their appearance are very much like mildew stains, but are due to quite different causes, and only a microscopical examination can reveal the true nature of the stains. Under the microscope the fiber of mildewed wool is found to have almost lost its characteristic scales, and to be split or dissolved into numerous cells so that the ends of the fibers possess the appearance of a brush. Such mildew stains are in dyeing quite resistant to coloring matters, so that according to the degree to which the fiber has been affected the stains appear after dyeing of a lighter color than the rest of the cloth, or they may remain altogether undyed.

The action of mildew stains toward various dyes was found as follows:

Scarlet, dyed in one bath with cochineal, tin crystals and oxalic acid—White spots of varying sizes.

Billard-cloth green, dyed with acid green, sulfuric acid and Glauber's salt—White spots, fiber very rotten.

Moss-green, dyed with indigo carmine, fustic and alum in one bath—Light greenish-yellow stains, the pile of which is entirely destroyed.

Vat-blue, topped with logwood—Large and small stains, dyed an uneven light blue.

Vat-blue, medium-shade—Irregular white spots.

Dove-gray, dyed with alizarine blue S W—Pale blue spots.

Dark brown, dyed in one bath with fustic and camwood, with copper and iron sulfate—Large and small light brown stains.

Logwood black, with ferrous sulfate—Light bluish stains.

The mildew stains on the logwood black are very similar to the stains caused by soap remaining in the cloth in the washing. In all cases the microscopical examination of the above samples showed the scaleless and split fibers.—*Farber-Zeitung*.

HAND PAINTED CLOTHS OF INDIA.

Khalam-kar or hand painted cloths cannot be placed in competition with European productions of a similar character, which, so early as the days of the Moghul Emperor Akbar, attracted the remark of being "the wonderful works of the European painters of world-wide fame." But the boldness of the designs, with the careful draughtsmanship of the minutest details, and their general finish and harmonious coloring, give them a fascination of their own, and this, taken with their cheapness, would necessarily find them favor in the eyes of many purchasers, if they could only be introduced in merchantable quantities into Europe. They can be utilized as tablecloths, bed-sheets, curtains, and other articles.

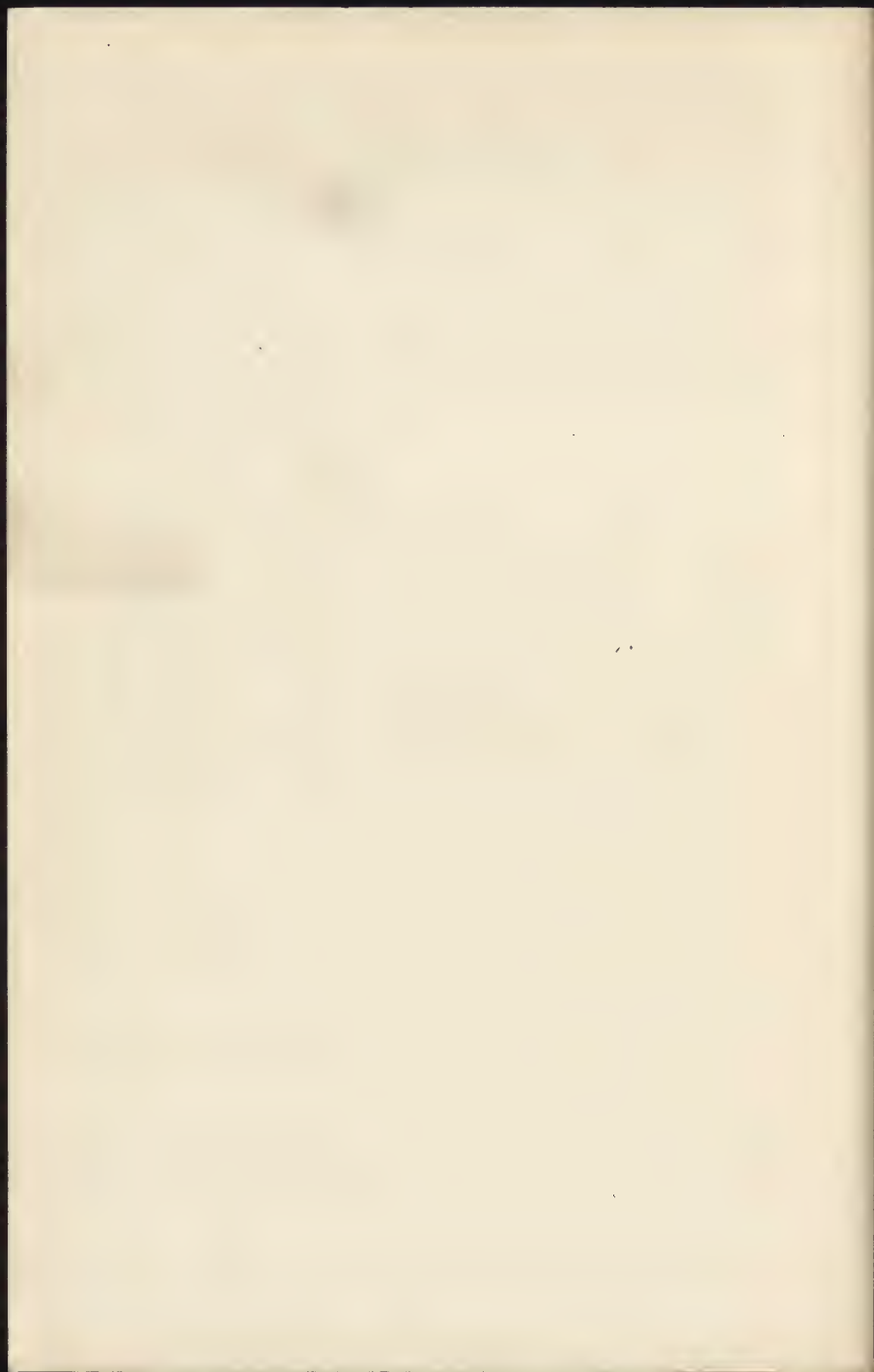
The process of making these cloths is remarkably primitive and simple. The first stage in the process is the preparation of the cloth for the painting. This is done as follows. A sufficient quantity of gall-nut is powdered and boiled in water, and the sediment is removed; after which one-fourth measure of buffalo's milk, or one-half measure of cow's milk, is mixed with water; the cloth is then put into it and saturated; and after a time it is taken out, strained and allowed to

dry. It is subsequently folded and beaten down with a dyer's block. The cloth is now ready for purposes of painting. The painter takes a quantity of alum, and boils it in water. With this solution, which gives a pale dark color, flowers and other objects are drawn artistically with a brush, or printed with a block on the cloth. The cloth is now dried, and gently washed in water. It is then boiled in water with pounded roots of numa (*Morinda umbellata*). During the continuance of the boiling process, which lasts for nearly three hours, the cloth is frequently stirred up with a stick. It is then taken out, and left to cool. When cooled, it is immersed in water mixed with sheep-dung, and immediately taken out. It is again washed well, and dried by spreading for nearly six hours over the damp sand in the river bed. This process renders the vacant spaces between the flowers white. The white portions are then colored with dyes of local manufacture, or with any European dye, after it has been boiled with gall-nut water. White and black, are believed by the Hindus to be the origin of all colors, and are looked upon as extremes, and as the component parts of the other colors. Indigenous black color is obtained by burning pieces of old iron in dry plantain leaves; and then boiling them in water with sugar-cane jagery and pounded marking nut (*Semicarpus Anacardium*). Yellow is manufactured by dissolving Bengal saffron with *aplakaram*, a substance akin to soda, and boiling in water with gall-nut "flowers." Green color is obtained by dissolving pure indigo in similarly treated water. Other colors are prepared by similar devices, and each color is painted in separately. Finally, the cloths are soaked in boiled rice water and strained. They are then ready for the market.

The price of a bed-sheet of *khalam-kar* ranges from 30 to 40 cents.—*Journal Society of Arts*.



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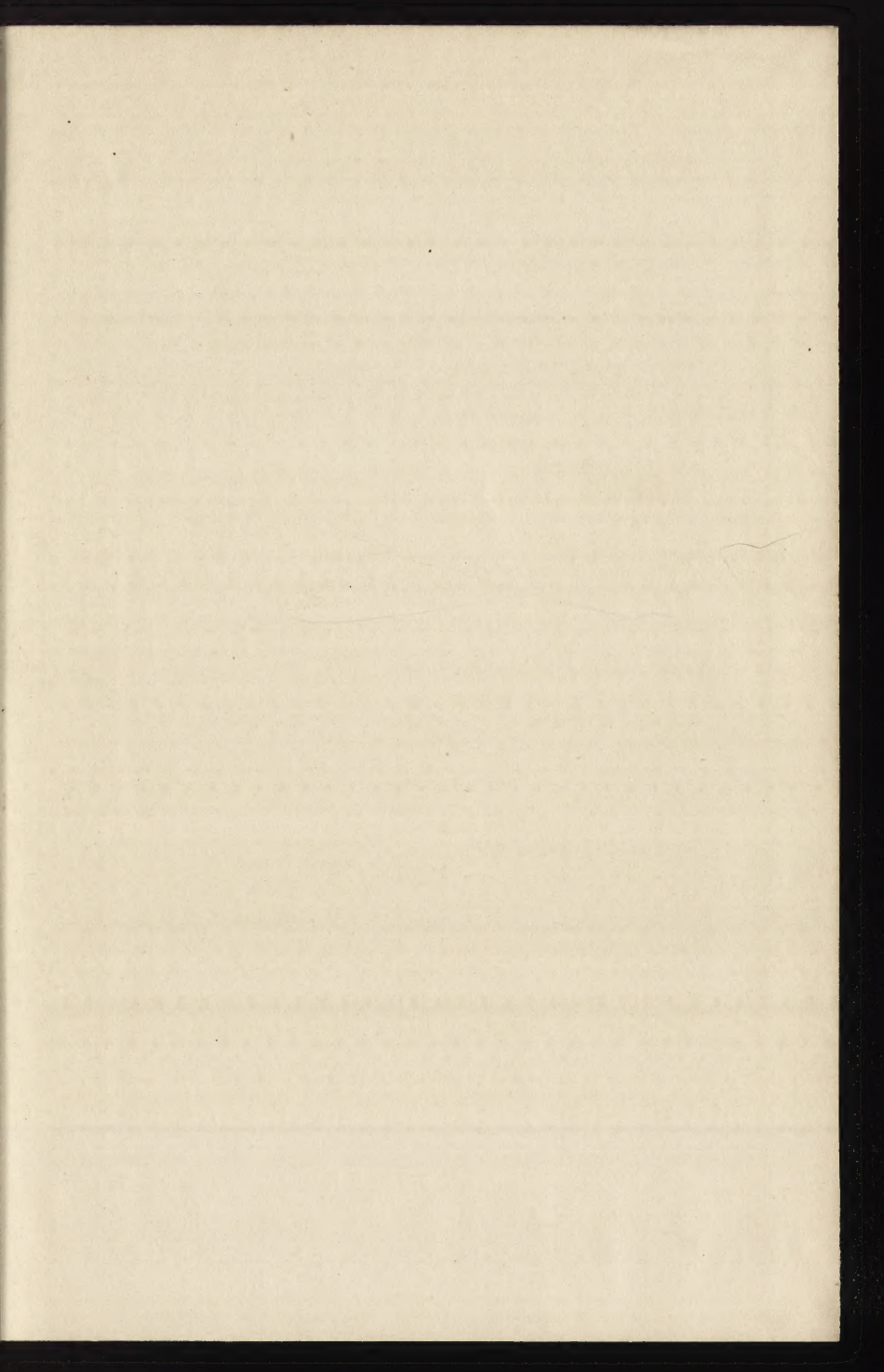
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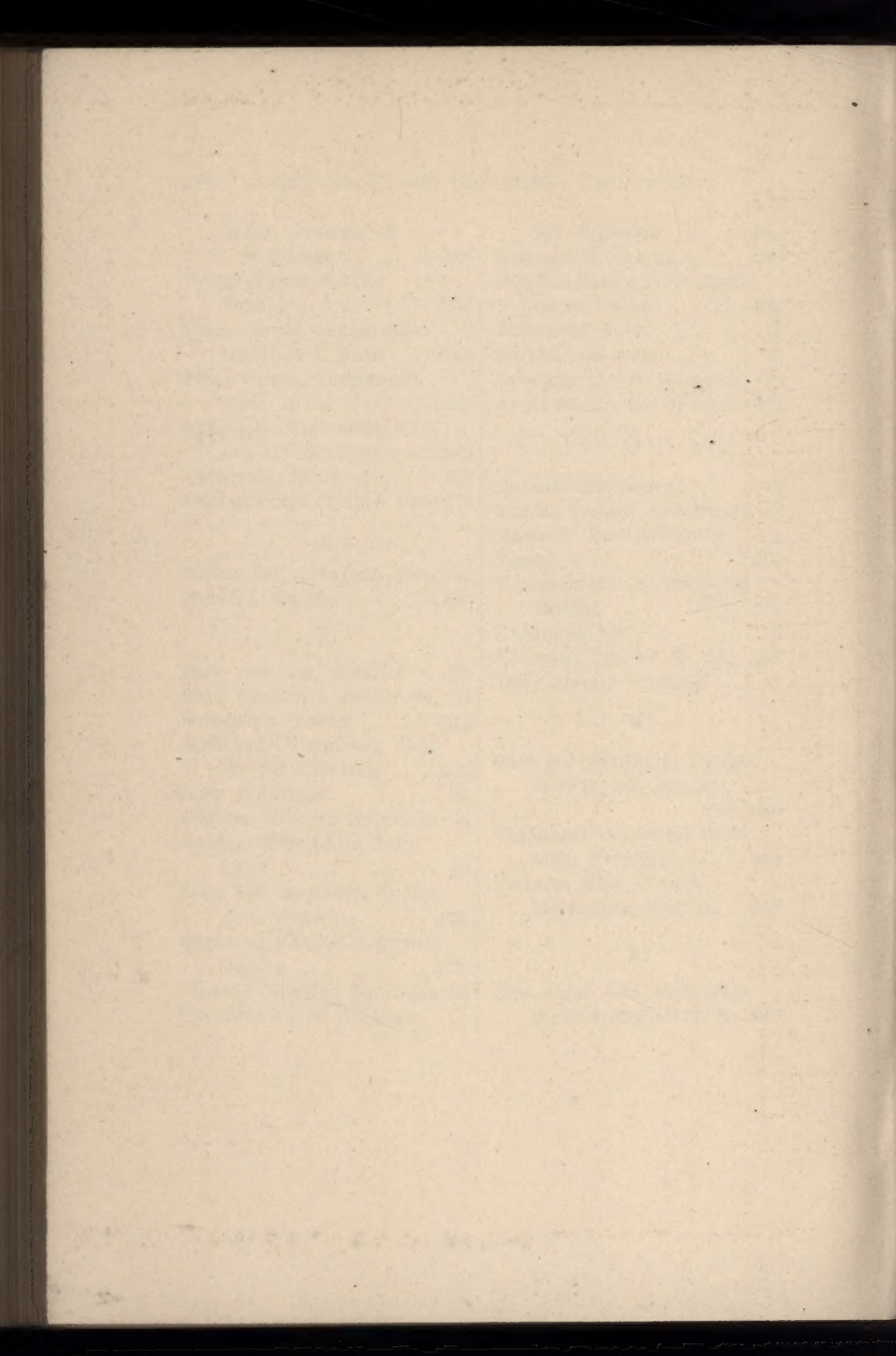
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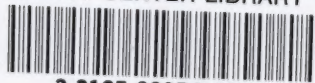
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